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# COMMERCIAL FISHERIES REVIEW

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# COMMERCIAL FISHERIES REVIEW



A review of developments and news of the fishery industries  
prepared in the BRANCH OF COMMERCIAL FISHERIES

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Mailed free to members of the fishery and allied industries. Address correspondence and requests to the: Director, Fish and Wildlife Service, U. S. Department of the Interior, Washington 25, D. C.

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# COMMERCIAL FISHERIES REVIEW

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## MAINE HERRING EXPLORATIONS AND FISHING GEAR EXPERIMENTS

By Keith A. Smith\*

### SUMMARY

Starting on May 1, 1956, the dragger Metacomet was chartered to continue the field work of the Maine Herring Exploration and Gear Research program started by the Service vessel Theodore N. Gill. The charter continued from May 1 through the spring, summer, and fall of 1956 to October 31.

Exploratory fishing was conducted in the inside waters along the Coast of Maine and in the Gulf of Maine. All areas traversed were sounded with a recording echo-sounder and searched visually for herring. Fishing efforts were made with herring gill nets and a nylon midwater trawl, principally along the eastern part of the coastline from Penobscot Bay to Passamaquoddy Bay and in the eastern part of the Gulf of Maine where there was a scarcity of herring during the entire season.



FIG. 1 - THE METACOMET, A GLOUCESTER DRAGGER, WHICH WAS CHARTERED FOR THE 1956 SEASON.

Herring "brit" were found to be present in many of the inside waters of these areas as were sounded and fished with a midwater trawl. A special "brit" survey made in August located schools of young herring in nearly every major inside body of water.

Herring gill-net sets made in June, July, and August, along the eastern part of the coast and in offshore locations in the eastern Gulf of Maine produced only trace catches of herring. The scarcity of sardines in inside waters and the general lack of herring schools found offshore are in agreement with the findings of the industry as reflected in the very poor catches of sardines in this area during the 1956 season.

Fishing gear experiments showed the Barraclough and Johnson midwater trawl to be a useful unit of gear for sampling soundings of herring "brit," but not a dependable method of catching herring or sardines in coastal and Gulf of Maine waters during the sardine season. A smaller midwater trawl patterned after the Barraclough and Johnson trawl but with all measurements cut in half proved as effective as the larger net for sampling soundings of "brit."

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A depth meter was constructed to show the depth of midwater trawls continuously during tows.

Trial sets were made with a modified lampara seine and with a purse seine from the Metacomel using a power block to haul the nets aboard. Results with the lampara were not encouraging. But the method of handling the purse seining showed promise of a successful operation. The method may be of considerable use to the project in succeeding seasons.

### BACKGROUND

For many years the Maine sardine industry has been troubled by the erratic occurrence in the usual fishing areas of herring schools suitable for processing into sardines. Early in 1955, the Maine Herring Exploration and Gear Research project and the biological Herring Investigation project were established at the Boothbay Harbor, Me., Research Station of the U. S. Fish and Wildlife Service to assist the sardine industry in solving this problem. Funds for the project were made available through Public Law 466 (The Saltonstall-Kennedy Act).



FIG. 2 - THE CANADIAN-TYPE MIDWATER TRAWL BEING SET FROM THE STERN OF THE METACOMET.

It was believed that unutilized and perhaps unknown schools of the young Atlantic herring (Clupea harengus) that are processed into Maine sardines might possibly occur in the Gulf of Maine waters during the spring, summer, and fall months. If such schools could be located and a practicable method found for catching and bringing the fish to the processor in proper condition for canning, the dependence of the industry upon inshore herring might be lessened and the supply of available fish increased.

In May of 1956, the Metacomel, an East Coast dragger-type vessel of 62 feet overall length, was chartered to continue the herring exploration and gear development work. A series of nine cruises were made between May 1 and October 31, 1956.

### MIDWATER TRAWL EXPERIMENTS

Of the nine cruises, four were concerned principally with midwater trawl operations. The midwater trawl was also used during the other cruises for sampling fish schools that were located by echo-sounding. All areas traversed were sounded for herring continuously with a recording-type echo-sounder.

The midwater trawl was patterned after one built by the Fisheries Research Board of Canada (Barraclough and Johnson 1956). This trawl was constructed of nylon with a square opening of 32 feet, and was 170 feet long. The mesh size was graduated in the three body sections from 5-inch to  $4\frac{1}{2}$ -inch to  $3\frac{1}{2}$ -inch. Four tapered and two straight cod-end sections were constructed of  $1\frac{1}{4}$ -inch mesh. After the second cruise, part of the cod end was lined with  $\frac{1}{2}$ -inch mesh netting so that it could retain approximately 2.5 bushels of small fish.

Work with the trawl had two purposes: (1) to try out a new type of sardine-fishing gear that could be operated in open ocean waters, and (2) to develop a means of sampling at any depth fish that were located with echo-sounding equipment. The period from May 9 to May 19 was devoted to problems of operation. After two trial sets in Casco Bay, the remainder of the cruise was spent searching for schools of herring on which to try the net. Although the coastline and some inside waters of the



Gulf of Maine were sounded at this time, no schools of fish were located on which the net could be set. Two additional trial tows were made, the last one over very small soundings near Race Point, Cape Cod. Only the first trial in Casco Bay took any fish. A small quantity of "brit" (herring under 4 inches total length) was taken in this tow.

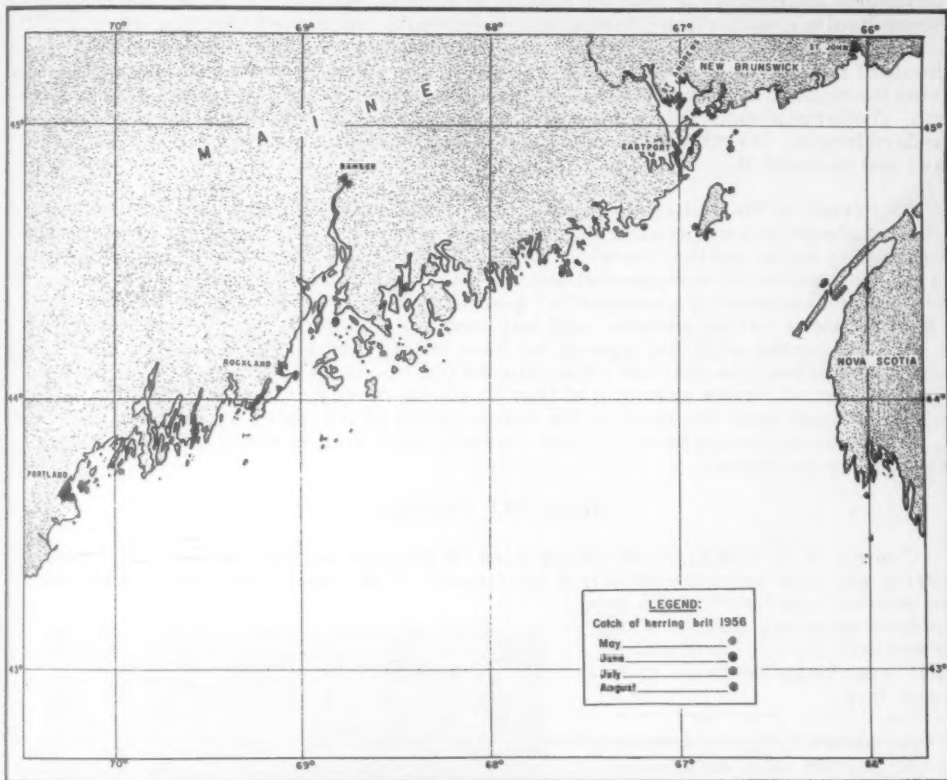


FIG. 3 - POSITIONS OF SOUNDINGS AND CATCHES OF HERRING BRIT, 1956.

Between Cruises 1 and 2, an extra gallows was installed on the Metacomet. This allowed the setting of the trawl from the stern. The trawl could be set and hauled more easily by this method, and since it could be set and hauled while the vessel was moving slowly forward, there was a minimum danger of dragging it on the bottom.

The second cruise (May 30 to June 6) was also spent sounding and fishing with the midwater trawl. Although little time could be spent fishing during this cruise because of heavy fog, 8 tows were made over fish soundings. The first tow in northeast Penobscot Bay caught 29 herring of 5.6 inches average standard length; the other tows took no herring. Small catches of whiting (up to two bushels per tow) were taken on June 5 and 6 where fish were sounded approximately 5 miles southeast of Monhegan Island.

August 20 to August 31 was spent on a survey of the "brit" that might become large enough for canning by the fall months. All inside waters from Portland to Eastport were sounded during this cruise, and fish soundings were sampled with the midwater trawl. As shown in figure 3, small herring were taken at this time in some part of nearly every bay along the coast from Eastport to Portland. By the start of this cruise, the trawl had been developed into a dependable tool for determining whether or not the soundings were of herring "brit." It had not, however, proved to be a dependable method of catching quantities of larger herring.

The period September 5 to 15 was spent sounding for larger schools of mature herring and trying the net on the soundings. During this cruise, fish were sounded and tows made at the Isle of Shoals, Boon Island, on the North, East, and South sides of Cape Cod, and in Narragansett Bay. Small quantities (less than 100 pounds) of bluebacks (*Pomolobus aestivalis*), a species closely related to the herring, round herring (*Etrumeus sadina*), butterfish (*Poronotus triacanthus*), anchovies (*Anchoa mitchilli*), and whiting (*Merluccius bilinearis*) were caught. Near the end of the cruise, large schools of fish were sounded in Ipswich Bay. Tows were made through these soundings during the night of September 14-15 with the trawl positioned at the depth of the soundings. The largest catch was 2.5 bushels of bluebacks between 9 and 9.5 inches average standard length. It seemed apparent that the fish were able to detect the approaching trawl and to avoid it.

As a result of the findings of these cruises, particularly Cruise 7, it was concluded that the midwater trawl, as used aboard the *Metacommet*, would be useful for sampling soundings to learn whether herring "brit" of less than 4 inches length were present. But without further developmental work it would not provide a dependable method of taking either samples or commercial quantities of larger herring in the open Gulf of Maine waters during summer and fall months. It is considered significant that the best successes with this type of net have been achieved in the British Columbia herring fishery where catches exceeding 30,000 pounds a tow have been reported from the narrow inside channels of that Province during cold winter months. The herring become quite inactive as the temperature of the water approaches the freezing point; consequently these fish are probably less able to avoid an approaching trawl during the winter.

#### GILL-NET FISHING

Cruises 3, 4, and 5, made during June 14 through August 10, were exploratory. Herring gill nets were the principal gear used. This was at the height of the sardine season, and there was a good supply of sardines inshore along the western part of the Maine coast from Cape Porpoise to Penobscot Bay.

As shown in figure 4, nearly all the gill-net sets were made east of Penobscot Bay or offshore.

No schools of herring other than "brit" were located either offshore or inshore. A few small catches were made in various locations as indicated on figure 4. However, in relation to the amount of gear set, these were considered trace catches. In June, the nets were set in the bays and inlets from St. Andrews Bay to North Haven Island. In most cases, they were set blind, i.e., without positive soundings of fish. As shown on the chart, a few herring were taken in scattered locations from Frenchmans Bay to St. Andrews Bay. Negative sets were also made in various locations from North Haven Island to Machias Bay, in many cases close by the positions where the few small catches were taken.



FIG. 4 - GILL NETS BEING HAULING ABOARD THE *METACOMMET*.

The gill-net sets made in July showed the same pattern of catches. In some of the inshore sets, a scattering of sardine-size fish were taken. Offshore sets yielded only 8 herring of 8.7 inches average standard length at Old Proprietor Buoy near

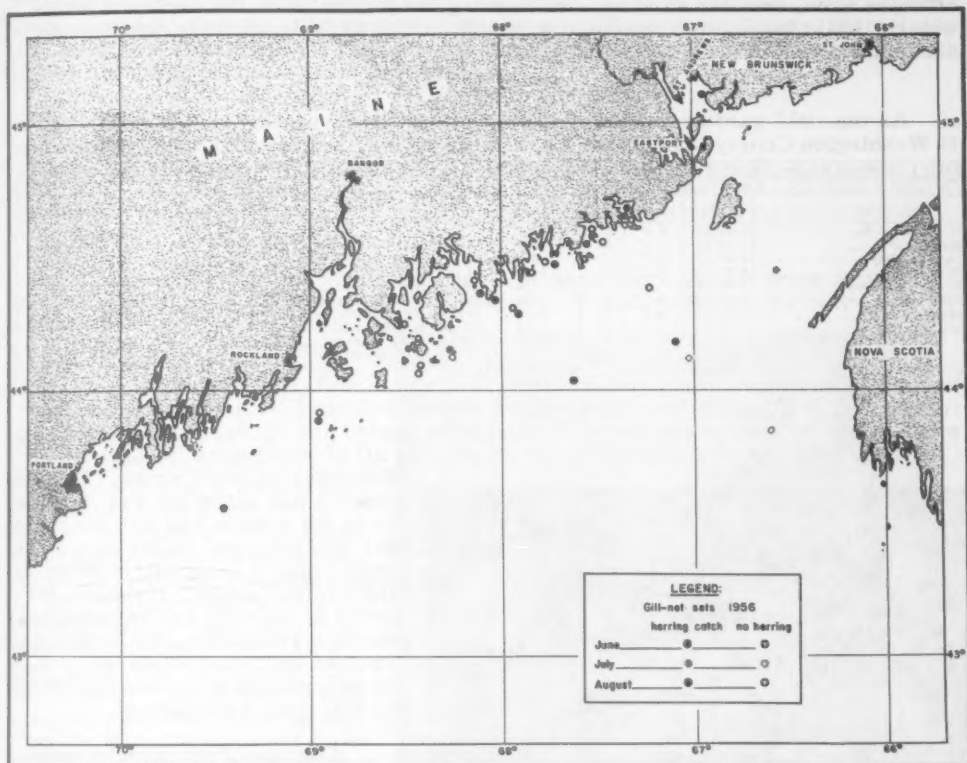


FIG. 5 - GILL-NET SETS MADE BY THE METACOMET DURING JUNE, JULY, AND AUGUST 1956. SMALL "TRACE" CATCHES WERE MADE AT THE POSITIONS INDICATED.

Grand Manan Island, but completely negative results were obtained on Grand Manan Bank and 8 miles northwest of Lurcher Shoal.

In August, the gill nets were set only in open, outside locations. Trace catches were taken in sets on Grand Manan Bank, 25.5 miles southeast of Schoodic Island, 5¼ miles southeast Schoodic Island, 3¼ miles northwest Matinicus Island, and 13 miles south-southwest Monhegan Island. Negative results were obtained in the sets near Swan's Island and 8½ miles southwest Machias Seal Island.

The same pattern prevailed in gill-net fishing results in all sets made during June, July, and August. Very small catches of herring were made in the eastern coastal and offshore areas. It appears that these catches were made from very small groups of fish or a scattering of individual fish rather than from any large school of fish.

The herring catches in offshore areas were principally larger fish, over 9 inches average standard length and therefore too large for sardines. Fish that averaged less than 9 inches average standard length were taken in only two of the ten small catches which were made in locations considered to be offshore. Fish from these catches measured 8.3 inches and 8.7 inches average standard length and were taken at positions 3¼ miles northwest of Matinicus Island and at Old Proprietor Buoy in the mouth of the Bay of Fundy.

Of 8 catches in the inside locations, only one included herring that reached or exceeded 9 inches. The Machias Bay catch was of fish with an average standard length of 9.1 inches. Thus, in the small catches taken in gill nets in the eastern and offshore area, smaller sardine-size herring predominated in the enclosed inside waters, while larger fish measuring over 9 inches were dominant in outside and offshore areas.

### DISCUSSION

As the 1956 sardine season came to a close on November 30, the year's catch in Washington County (Statistical Areas 5 through 8, Scattergood 1949) appeared to

Table 1 - Average Standard Length of Herring in Gill-Net Catches Taken in Inside Waters Compared to Those Taken in Open Ocean Waters

Inside Areas					Outside Areas				
Location	Date	Avg. Length	No.	Length x No.	Location	Date	Avg. Length	No.	Length x No.
St. Andrews Bay .....	6-16-56	8.4"	23	147.2	Schoodic Is. ....	6-28-56	9.1"	6	54.6
Machias Bay .....	6-19-56	7.5"	19	142.5	Mt. Desert Rock .....	7-13-56	9.4"	2	18.8
Chandler Bay .....	6-26-56	8.7"	1	8.7	Mt. Desert Rock .....	7-13-56	13.4"	3	40.2
Nash Island .....	6-27-56	8.3"	2	16.6	1 mi. S. Mt. Desert Rock .....	7-13-56	12.2"	1	12.2
Frenchmans Bay .....	6-28-56	7.9"	1	7.9	Proprietor Buoy .....	7-17-56	8.7"	7	60.9
Fisherman Island .....	7-10-56	8.7"	2	17.4	3 1/2 mi. NW. Matinicus .....	8-1-56	8.3"	22	182.6
Machias Bay .....	7-15-56	8.9"	10	89.0	5 1/2 mi. SW. Schoodic Is. ....	8-2-56	10.8"	3	32.4
Machias Bay .....	7-15-56	8.9"	6	54.6	Grand Manan Bank .....	8-4-56	9.5"	6	57.0
			64	483.1	25 1/2 mi. SE. Schoodic .....	8-5-56	10.2"	11	111.2
					13 mi. SSW. Monhegan .....	8-9-56	9.0"	11	108.9
483.1 ÷ 64 = Average Length = 7.55"					678.8 ÷ 72 = Average Length = 9.45"				

be one of the poorest in the history of the fishery, while a good to excellent season was experienced in the areas to the westward. Over 56 million pounds of herring were landed and processed in Washington County in 1956 (Anonymous 1956), but practically all of these were brought in from

the more western areas. The trend toward this situation was noted early in the season and was the reason for diverting the major part of the Metacomets exploratory effort to the eastern areas. However, instead of locating any valuable new sardine resources, the Metacomets cruises only confirmed the picture of general scarcity that the fishery in that area experienced.

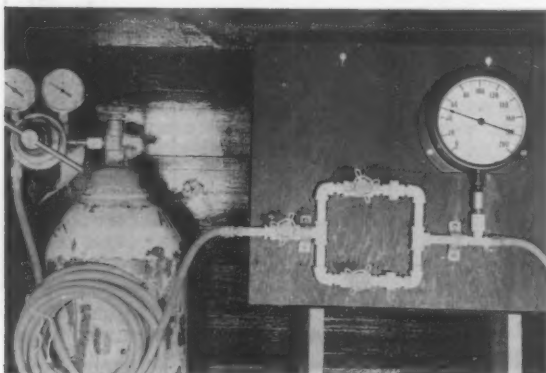


FIG. 5 - AIR SUPPLY AND AIR-PRESSURE GAUGE USED TO SHOW THE DEPTH OF A MIDWATER TRAWL.

used as an argument for (a) change in the limits. That there has been such a decline is well established."

It was claimed by some sardine fishermen as early in the fishery as 1896 that a decline in the available supply of sardines was occurring although H. F. Moore (1898) concluded that the decline at that time was limited to the supply of large "stringer" herring.

Bigelow and Schroeder point out that a scarcity of herring in any particular area is not an uncommon occurrence. However, they also show that since the start of the Maine sardine fishery in 1875, Washington County has generally been a top producer of sardines. "The distribution of commercial catches ... shows that herring are far more plentiful from Casco Bay eastward along the coast of Maine, and especially in the Passamaquoddy Bay-Grand Manan region than they are along the western shores of the Gulf on the one hand, or up the Bay of Fundy on the other, or along western Nova Scotia. Thus the landings per unit length of coast averaged 3 times as great for the Passamaquoddy-Grand Manan Region and for the Coast of Maine to Mount Desert, as for the coast sector from Mount Desert past Penobscot



Bay; about 4 times as great as for the Maine Coast as a whole, westward and southward from Penobscot Bay; and 13 times as great as for the Coast of Massachusetts, for the years 1919, 1928, 1929, and 1930" (Bigelow and Schroeder 1953).

It is evident that the 1956 scarcity of herring in Washington County, historically at least, is an anomalous situation; one that has occurred before in various areas, but then has improved in succeeding seasons.

#### OTHER GEAR TRIALS

Cruise 8 (September 26 to October 12) was devoted to experimentation with three pieces of gear: (1) a modified lampara seine, (2) a half-size (16-foot square opening) midwater trawl, and (3) a depth meter for use in measuring the depth at which midwater trawls are towed.

The lampara seine was patterned after a West Coast tuna bait seine that was used for sampling "brit" during the 1955 season. It differed from the bait seine in the following respects: (1) the wings were of smaller mesh size, 2 inches and 1.5 inches as compared to 4 inches and 3 inches in the original net, (2) it was approximately 50 percent longer than the bait seine, (3) a purse line was added, and (4) less bunt was provided in the center of the net. The latter two changes were made to allow easier setting and partial pursing while hauling the net. Trial sets were made in Boothbay Harbor and on soundings of fish in Casco Bay. However, no herring were caught in the lampara seine, and it was concluded that this seine as set from the Metacomet would probably be of no use in capturing sardines.

Short trial tows with the small midwater trawl were made in Casco Bay and Penobscot Bay on soundings of fish. The smaller trawl was tried to learn whether or not higher towing speeds that could be attained with it would result in greater catches. As with the larger midwater trawl, the 0-year class "brit" of 2.5 to 4 inches average standard length were easily caught. No catches of larger herring were made. This smaller trawl was, however, as effective as the larger one in taking samples of the smaller fish and was easier to operate. Results of tows with this smaller trawl are listed in the midwater trawl fishing log under Cruise 8.

A depth indicator was devised to show continuously the depth at which the midwater trawl was being towed. An accurate knowledge of the depth of the trawl is necessary when fishing on subsurface schools located by echo-sounding.

Water pressure at the depth of the trawl was used as the indicator of the depth. (Water pressure in standard sea water is 0.44 pounds per square inch per foot of depth.) In order to transmit the water pressure information from the position of the trawl to the deck of the vessel, an air-filled hose of  $\frac{3}{16}$ -inch inside diameter



FIG. 7 - PURSE SEINE LYING IN THE NET BIN ON THE METACOMET READY FOR SETTING.



was employed and a standard air-pressure gauge used to give the pressure reading. A very small volume of compressed air was added continuously at the top end of the hose and bubbled out the open bottom end into the water to keep the hose clear of water. A series of vertical lowerings on a measured line and towing tests have shown that the depth indicator does give true and accurate readings. A separate report has been written on this device (Smith 1957).

Prior to and during the ninth cruise of the Metacomet, trial sets were made with a purse seine. This was done to obtain information as to whether or not a New England dragger-type vessel could be adapted to purse-seining operations.



FIG. 8 - CLOSING PURSE SEINE ABOARD THE METACOMET.

If this were possible, a vessel of such seaworthy design and of the type which is available in this area might possibly be used in offshore waters of the Gulf of Maine and the North Atlantic Ocean for purse seining herring. The net was set over the port gunwale of the Metacomet from a seine bin constructed alongside the hatch (fig. 7). The purse lines were pulled through blocks on a seine davit to winch heads on the trawl winch, and the seine was hauled aboard with a power block. Although only a short period of time could be spent investigating this method, results were quite encouraging. The seine was set smoothly over the port gunwale in all trials. Due to the turning of the vessel, the seine pulled out away from the stern while setting and there was no tendency of the seine to be drawn into the propeller. Some difficulty was experienced while pursing. The bow of the vessel sometimes drifted into the seine and the purse line fouled in the web of the net. However, after several trial sets, these problems were largely overcome, and one smooth set was made without any trouble with fouling of lines.

The method of purse seining was not worked out early enough in the 1956 season to be of great value to the project during that particular season; however, it is expected that the techniques devised may be of considerable value to the project in future work. Indications are that this method can be used successfully on a properly-equipped dragger if sufficient trial sets are made to work out the problems encountered.

See pages 9-12 for table 2; pages 13-14 for table 3.

Table 2 - Fishing Log--W/V Metacomet Midwater-Trawl Tows, 1956

Grudge No.	Date	Gear	Tow No.	Position at Start		Time Started	Time Finished	Time Towed (Hrs.)	Soundings		Herring Catch	Avg. Std. Length	Tide Stage	Surface Temp. (Centigrade)
				Lat. N.	Long. W.				Min. Depth of Fish (Ft.)	Max. Depth of Fish (Ft.)				
1	8-9-56	1/32' Trawl	1	43°-45.3'	70°-2.8'	1520	1640	00120	18	60	1 bu. herring	2.4"	.SE	-
	8-10-56	32' Trawl	2	44°-40.8'	70°-7.9'	1325	1340	00115	20	40	0	-	.7E	-
	8-12-56	32' Trawl	3	44°-19.2'	69°-56.7'	1235	1705	00140	20	50	0	-	.SE	-
	8-17-56	32' Trawl	4	42°-4.7'	70°-13.0'	1345	1420	00145	15	45	0	-	.SE	-
2	8-31-56	32' Trawl	1	43°-50.8'	69°-48.0'	1310	1645	00135	30	35	0	-	H1	7.8°
	8-1-56	32' Trawl	2	44°-15.5'	69°-55.3'	1400	1315	01115	28	35	20 herring	5.6"	.SE	11.2°
	8-5-56	32' Trawl	3	44°-13.5'	69°-24.0'	1015	1045	00150	100	120	0	-	.7E	8.5°
	8-4-56	32' Trawl	4	44°-12.5'	69°-23.0'	1315	1340	00125	25	50	0	-	.SE	8.5°
3	8-5-56	32' Trawl	5	43°-43.0'	69°-10.0'	2210	2215	00105	15	65	0	-	.SE	9.1°
	8-5-56	32' Trawl	6	43°-43.0'	69°-10.0'	2300	2400	01100	15	65	0	-	.SE	9.2°
	8-6-56	32' Trawl	7	43°-43.0'	69°-10.0'	0045	0055	00110	15	65	0	-	.7E	9.2°
	8-6-56	32' Trawl	8	43°-47.2'	69°-38.5'	1055	1115	00120	10	55	0	-	.4E	11.3°
5	8-16-56	32' Trawl	1	43°-4.1'	69°-57.0'	0945	1045	01100	10	40	0	-	.7E	11.5°
	8-17-56	32' Trawl	2	43°-5.2'	69°-58.5'	0900	1000	01100	0	75	1 bu. herring	4.0"	.SE	11.0°
	8-18-56	32' Trawl	3	44°-59.0'	69°-55.1'	1045	1120	00135	15	45	1 bu. herring	2-2.5"	.SE	8.0°
	8-19-56	32' Trawl	4	44°-38.1'	69°-50.3'	0900	0915	00115	10	35	1 bu. herring	2-2.5"	.SE	7.2°
6	8-20-56	32' Trawl	5	44°-36'	69°-21'	0515	0545	00150	15	40	10 herring	2.1"	.7E	7.0°
	8-25-56	32' Trawl	6	44°-7.2'	69°-2.5'	1300	1322	00122	35	35	30 herring	2.0"	.SE	15.0°
	8-27-56	32' Trawl	7	44°-39'	69°-39.5'	1215	1237	00124	0	60	200 herring	2.2"	.SE	10.3°
	8-29-56	32' Trawl	8	43°-47.7'	69°-26.6'	0925	0950	00125	15	55	0	-	.1P	10.5°

NOTE: FOR EXPLANATION OF FOOTNOTES SEE P. 12.

Table 2 - Fishing Log-2/4 Metacomt Midwater-Trawl Tows, 1956 (Contd.)

Cruise No.	Date	Gear	Tow No.	Position at Start			Time Started	Time Towed	Time Finished	Time Towed of Fish (Hr.)	Soundings of Fish (Hr.)	Herring Catch	Avg. Std. Length	Tide Stage	Surface Temp. (Cont. Grade)
				Lat. N.	Long. W.	Geographical Reference									
4	7-13-56	32' Trawl	1	44°-40.3'	70°-3.5'	1 mi. E. Halfway Rk., Casco Bay	0605	0445	0040	15	20	0	-	.4E	14.0°
	7-13-56	32' Trawl	2	44°-42.9'	69°-9.8'	3 mi. E. Petit Pkg., St. Mary Bay	1516	1337	0042	16	100	2 herring	2.6"	.0E	14.0°
	7-13-56	32' Trawl	3	44°-41.7'	69°-12.8'	So. End Petit Pkg., St. Mary Bay	2115	2255	0040	25	50	2 bu. herring	4.6"	.4E	13.0°
	7-13-56	32' Trawl	4	44°-41.7'	69°-12.8'	So. End Petit Pkg., St. Mary Bay	2350	2400	0030	15	60	1 bu. herring	2.6"	.0E	14.1°
	7-13-56	32' Trawl	5	44°-41.7'	69°-12.8'	So. End Petit Pkg., St. Mary Bay	0030	0100	0030	0	65	12 herring	4.7"	.0E	13.4°
	7-13-56	32' Trawl	6	44°-41.7'	69°-12.8'	So. End Petit Pkg., St. Mary Bay	0126	0245	0110	0	65	100 herring	4.7"	.0E	13.3°
	7-13-56	32' Trawl	7	43°-48.4'	69°-30.9'	1½ mi. S. Pemaquid Point	2130	2140	0010	0	40	0	-	Low	-
	8-7-56	32' Trawl	1	44°-01.1'	68°-30.8'	5 mi. S. Marshall Island	0855	0945	0050	15	35	0	-	.77	12.0°
	8-3-56	32' Trawl	2	44°-16.9'	68°-38.2'	Tinker Is., Bluehill Bay	1040	1145	0105	8	60	½ bu. herring	3.2"	.27	12.0°
	8-8-56	32' Trawl	3	44°-18.1'	68°-47.1'	Spectacle Is., Funchest Bay	1850	1900	0030	0	50	½ bu. herring	2.6"	Low	14.1°
5	8-9-56	32' Trawl	4	44°-42.7'	68°-56.9'	NE End Long Is., Funchest Bay	1100	1130	0030	0	120	½ bu. herring	3.0"	.37	13.7°
	8-21-56	32' Trawl	1	43°-2.2'	67°-2.2'	1½ mi. upstream St. Croix Is.	1317	1333	0010	0	45	146 herring	4.7"	.4E	14.0°
	8-21-56	32' Trawl	2	43°-3.8'	68°-56.8'	Off Lettice Pkg., Passamaquoddy Bay	1500	1633	0014	0	50	½ bu. herring	2.13"	.7E	14.0°
	8-21-56	32' Trawl	3	44°-53.6'	67°-1.1'	Channel between Blackford Rd. and Rewards Neck	1737	1815	0038	0	50	½ bu. herring	2.8"	.17	12.0°
	8-22-56	32' Trawl	4	43°-1.8'	68°-52.6'	Off Macabin Pt., Light, Deer Is.	1250	1260	0020	0	20	½ bu. herring	2.7"	.2E	11.0°
	8-22-56	32' Trawl	5	44°-55.9'	68°-42.8'	½ mi. South of Wolves Is.	1445	1500	0005	0	50	½ bu. herring	2.8"	.7E	12.0°
	8-22-56	32' Trawl	6	44°-53.7'	68°-30.2'	10 mi. SE of Wolves Is.	1715	1730	0015	0	20	0	-	.0E	12.5°
	8-22-56	32' Trawl	7	44°-43.7'	68°-47.1'	2 mi. NW Digby Gut Bay of Fundy	0915	0930	0015	0	80	½ bu. herring	2.4"	.57	11.0°
	8-24-56	32' Trawl	8	44°-47.5'	68°-45.1'	North Head Bay Grand Manan Is.	1000	1015	0015	0	100	8 bu. herring	2.9"	.57	12.0°
	8-24-56	32' Trawl	9	44°-38.1'	68°-54.6'	Bradford Cove Grand Manan Is.	1250	1310	0020	0	50	2.5 bu. herring	3.0"	Low	10.0°
6	8-25-56	32' Trawl	10	44°-38.8'	67°-10.4'	North Cutler Bay	0832	0845	0013	0	50	61 herring	2.7"	.0E	10.0°
	8-25-56	32' Trawl	11	44°-37.1'	67°-10.6'	Melville Bay	0833	0915	0042	0	70	½ bu. herring	3.0"	.27	11.5°
	8-25-56	32' Trawl	12	44°-31.1'	67°-30.1'	1 mi. off Black Hd., Head Rkr. Is.	1150	1205	0015	0	65	1 bu. herring	3.1"	.57	12.0°

NOTE: FOR EXPLANATION OF FOOTNOTES SEE P. 12.

Table 2 - Fishing Log--W/V Wisconsin-Minister-Trawl Tows, 1956 (Contd.).

Cruise No.	Date	Gear	Tow No.	Lat. N.	Long. W.	Position at Start Geographical Reference	Time Started	Soundings			Herring Catch	Avg. Std. Stage Length (Centigrade)	Tide	Surface Temp.
								Time Towel Finished (Hrs.)	Min. Depth of Fish (Ft.)	Max. Depth of Fish (Ft.)				
6 (cont.)	8-28-56	32' Trawl	15	44°-25.6'	69°-16'	Sunken Ledge Buoy Western Bay	0942	0911	0	80	$\frac{3}{4}$ bu. herring	2.9"	.8P	15.8°
	8-28-56	32' Trawl	16	44°-23'	69°-7.6'	SE Shore Iron Bound Is. Truman Bay	1300	1321	0	50	1 bu. herring	5.8"	.8P	15.0°
	8-28-56	32' Trawl	15	44°-23'	69°-27.1'	Highhead Union River	1908	1916	25	80	2 bu. herring	2.8"	.8P	16.0°
	8-27-56	32' Trawl	16	44°-9.1'	69°-42.0'	Hall's Hook, Jersey Bay	0840	0932	0	40	0	-	.8P	14.5°
	8-27-56	32' Trawl	17	44°-22.6'	69°-50.0'	Off Castline, Penobscot Bay	1400	1420	80	125	0	-	.8P	12.0°
	8-28-56	32' Trawl	18	43°-46.6'	69°-54.8'	North Penobscot River	0613	0650	40	50	0	-	.7E	14.8°
	8-28-56	32' Trawl	19	43°-54.2'	69°-54.5'	Plummer Pt. Penobscot River	0946	1005	25	65	5 herring	4.6"	.8E	16.0°
	8-28-56	32' Trawl	20	43°-50.2'	69°-41.6'	Off Bonstock Hbr. Sheepscot River	1155	1205	0	50	3 bu. herring	5.1"	.8P	12.0°
	8-28-56	32' Trawl	21	43°-52.6'	69°-41.8'	Lower Tip Barbers Is.	1358	1308	15	90	$\frac{3}{4}$ bu. herring	2.6"	.8P	13.2°
	8-28-56	32' Trawl	22	43°-46.4'	69°-53.6'	Mouth New Meadows R. Casco Bay	1540	1600	0	40	$\frac{3}{4}$ bu. herring	5.5"	.8P	16.5°
	8-28-56	32' Trawl	23	43°-42.9'	70°-1.0'	Western Shore Bailey Is. Casco Bay	1758	1822	0	50	0	-	.2E	16.8°
7	8-30-56	32' Trawl	24	43°-39.8'	70°-1.0'	Mt. Hussy Sound, Casco Bay	0940	0955	15	50	$\frac{1}{4}$ bu. herring	5.6"	.8E	15.8°
	8-5-56	32' Trawl	1	43°-07.6'	70°-25.6'	$\frac{3}{4}$ mi. W. Boon Is. Ledge	2100	2115	25	35	$\frac{1}{4}$ bu. blueback	$\frac{1}{4}$ (9.0")	.7P	19.8°
	8-6-56	32' Trawl	2	43°-55.6'	70°-38.6'	0.6 mi. W. Longing Is.	0950	0945	25	45	$\frac{1}{4}$ bu. blueback	(9.0")	.8E	18.2°
	8-10-56	32' Trawl	3	40°-20'	70°-56'	4.4 mi. W. Gay Is. Marthas Vineyard	5000	2010	20	40	(20 round herring)	(6.5")	.8E	15.0°
	8-11-56	32' Trawl	4	41°-33'	71°-16.7'	Harraganet Bay	0950	0945	20	55	2 herring	6.0"	.7P	19.7°
	8-12-56	32' Trawl	5	41°-42.1'	69°-50.0'	Chatham Buoy, Cape Cod	0115	0125	25	85	5 herring	9.4"	.8P	16.3°
	8-13-56	32' Trawl	6	42°-48.1'	70°-39.3'	$\frac{3}{4}$ mi. E. Western Pt. Gloucester Hbr.	0540	0550	30	90	0	-	.8E	15.8°
	8-13-56	32' Trawl	7	42°-49.8'	70°-46.7'	$\frac{1}{4}$ mi. E. Marianne R. Ipswich Bay	1940	2040	25	85	$\frac{1}{4}$ bu. blueback	(9.0") Low		16.0°
	8-13-56	32' Trawl	8	42°-48.2'	70°-46.6'	$\frac{1}{4}$ mi. E. Marianne R. Ipswich Bay	2150	2150	20	90	0	-	.8E	16.3°

NOTE: FOR EXPLANATION OF FOOTNOTES ON P. 12.

Table 2 - Fishing Log-#V Massachusetts Midwater-Trawl Tows, 1956 (Contd.)

Cruise No.	Date	Tow No.	Position at Start		Time Started	Time Finished (Hrs.)	Time Towed (Hrs.)	Soundings		Herring Catch	Tide Gage Length Start (Centigrade)	Surface Temp.		
			Lat. N.	Long. W.				Min. Depth of Fish (Ft.)	Max. Depth of Fish (Ft.)					
8	9-27-56	23 <sup>1</sup> Trawl	1	43°-42.4'	70°-0.9'	Off Little Chebeague Is., Casco B.	1030	1041	0011	25	43 herring	3.6"	11.8°	
	9-27-56	23 <sup>1</sup> Trawl	2	43°-39.8'	70°-0.7'	Mouth Huxsey Sound, Casco Bay	1116	1125	0010	25	23 herring	3.6"	11.8°	
	10-4-56	16 <sup>1</sup> Trawl	3	43°-42.4'	70°-0.9'	Little Chebeague Is., Casco Bay	0645	0705	0020	50	$\frac{1}{2}$ bu. herring	3.4"	-	
	10-4-56	16 <sup>1</sup> Trawl	4	43°-42.4'	70°-0.9'	Little Chebeague Is., Casco Bay	0735	0755	0020	15	1 bu. herring	3.4"	-	
	10-4-56	16 <sup>1</sup> Trawl	5	43°-44.9'	70°-4.0'	Little Whale Boat Ledge Broad Bay	1105	1120	0015	25	$\frac{1}{2}$ bu. herring	3.8"	-	
	10-4-56	16 <sup>1</sup> Trawl	6	43°-42.9'	70°-1.2'	Haskell Island, Casco Bay	1205	1205	0005	25	0	-	-	-
	10-4-56	16 <sup>1</sup> Trawl	7	43°-39.8'	70°-0.7'	Mouth Huxsey Sound Casco Bay	1400	1415	0015	25	$\frac{1}{2}$ bu. herring	4.0"	-	-
	10-11-56	16 <sup>1</sup> Trawl	8	44°-19.4'	68°-57.1'	Off Spruce Hd., Penobscot Bay	1030	1150	0120	50	150 herring	3.6"	11	-
	10-11-56	16 <sup>1</sup> Trawl	9	44°-19.4'	68°-57.1'	Off Spruce Hd., Penobscot Bay	1230	1350	0120	50	$\frac{1}{2}$ bu. herring	3.2"	43°	-
	10-11-56	16 <sup>1</sup> Trawl	10	44°-20.2'	68°-50.7'	E. Long Island Penobscot Bay	1510	1550	0040	50	1 bu. herring	2.7"	48°	10.6°
	10-11-56	16 <sup>1</sup> Trawl	11	44°-7.6'	68°-59.5'	Between Rockland & No. Haven Is.	1725	1745	0020	20	3 bu. herring	3.3"	42°	-
	10-12-56	16 <sup>1</sup> Trawl	12	44°-7.6'	68°-59.5'	Between Rockland & No. Haven Is.	0850	0945	0015	25	$\frac{1}{2}$ bu. herring	3.4"	48°	-
9	10-25-56	16 <sup>1</sup> Trawl	1	43°-5.9'	66°-47.9'	Center Passamaquoddy Bay	1055	1115	0020	0	$\frac{1}{2}$ bu. herring	2.9"	48°	9.7°

1/ The 32<sup>1</sup> trawl was a 32<sup>1</sup> square opening at its mouth. The 16<sup>1</sup> trawl was a 16<sup>1</sup> square opening.

2/ MIDWATER TRAWL CATCHES OF BRIT WERE SMALL AND CAN BE CONSIDERED ONLY AS A SAMPLE OF THE FISH STOCK SINCE THESE FISH WERE SO SMALL AS TO PASS THROUGH THE MESHES EXCEPT AT THE REAR OF THE COD END.

3/ 1 BASKET OF HERRING WAS OBSERVED IN THE MOUTH OF THE 16<sup>1</sup> TRAWL ON 10-4-56. AFTER CRUISE 2 A SMALL MESH LINER WAS PUT IN PART OF THE COD END TO HOLD MORE FISH. THIS, HOWEVER, WAS DESIGNED TO RETAIN ONLY A SMALL SAMPLE OF BRIT.

4/ CATCHES OF FISH CLOSELY RELATED TO HERRING ARE ALSO LISTED FOR CRUISE 7 SINCE IT WAS THE PURPOSE OF THIS CRUISE TO TRY THE TRAWL ON HERRING AND "HERRING-LIKE" FISH. THE CATCHES OF CLOSELY-RELATED SPECIES ARE ENCLOSED IN PARENTHESES.

1/ THE 32<sup>1</sup> TRAWL HAS A 32<sup>1</sup> SQUARE OPENING AT ITS MOUTH. THE 16<sup>1</sup> TRAWL HAS A 16<sup>1</sup> SQUARE OPENING.

2/ MIDWATER TRAWL CATCHES OF BRIT WERE SMALL AND CAN BE CONSIDERED ONLY AS A SAMPLE OF THE FISH SOUNDED SINCE THESE FISH WERE SO SMALL AS TO PASS THROUGH THE MESHES EXCEPT AT THE REAR OF THE COD END. THE BRIT WERE NOT KEPT FOR ANALYSIS. AFTER CRUISE 2 A SMALL MESH LINER WAS PUT IN PART OF THE COD END TO HOLD MORE FISH. THIS, HOWEVER, WAS DESIGNED TO RETAIN ONLY A SMALL SAMPLE OF BRIT.

3/ CATCHES OF FISH CLOSELY RELATED TO HERRING ARE ALSO LISTED FOR CRUISE 7 SINCE IT WAS THE PURPOSE OF THIS CRUISE TO TRY THE TRAWL ON HERRING AND "HERRING-LIKE" FISH. THE CATCHES OF CLOSELY-RELATED SPECIES ARE ENCLOSED IN PARENTHESES.



Table 3 - Fishing Log-477 Metacomb Gill-Net Sets, 1956

Cruise No.	Date	Gear Length	Set No.	Set Location			Time Started (EST.)	Time Stopped (EST.)	Tide Stage Start	Herring Catch	Avg. Std. Length (Centigrade)	Surface Temp. (Centigrade)
				Lat. N.	Long. W.	Geographical Reference						
3	6-18-56	50 fathoms surface set	1	46°-4.8'	68°-58.1'	St. Andrews Bay	2235	11:40	.68	8 herring	6.4"	10°
			3	46°-4.8'	68°-55.5'	St. Andrews Bay	2235	11:40	.68	50 herring	6.4"	10°
		50 fathoms surface set	3	44°-38.6'	66°-49.8'	Red Head, Grand Manan Is.	2030	9:50	.12	0	-	7.5°
			4	44°-38.6'	66°-45.6'	Red Head, Grand Manan Is.	2000	9:50	.12	0	-	7.5°
		50 fathoms surface set	5	44°-39.2'	67°-20.1'	Upper Mobias Bay	2330	9:00	.68	0	-	8.0°
			6	44°-39.2'	67°-20.1'	Upper Mobias Bay	2330	10:00	.68	10 herring	7.8"	8.0°
	6-20-56	100 fathoms surface set	7	44°-34.5'	67°-31.7'	Shore Cove, Roque Is.	1800	14:00	.67	0	-	10.0°
			8	44°-11.7'	67°-27.2'	Black Island	2000	8:35	.77	0	-	10.0°
		50 fathoms surface set	9	44°-15.3'	68°-31.0'	W. Side Flys Is.	2000	8:35	.77	0	-	10.0°
			10	44°-7.5'	68°-55.2'	Wootter Cove, N. Haven Is.	1950	12:15	.27	0	-	11.5°
		50 fathoms bottom	11	44°-9.3'	68°-55.9'	Bartlett Harbor	2007	10:53	.37	0	-	11.0°
			12	44°-9.1'	68°-55.7'	1 mi. NNE Bartlett Har.	2022	11:23	.37	0	-	11.0°
	6-26-56	43 fathoms bottom	13	44°-39.1'	67°-34.4'	Mud Hole Pt., Ot. Mass Is.	1818	05:15	.92	0	-	9.0°
			14	44°-31.9'	67°-32.4'	Mark Is., Chandler Bay	1909	10:21	.81	1 herring	8.7"	8.3°
		50 fathoms bottom	15	44°-34.6'	67°-29.1'	Halifax Is., Engleburns Bay	1940	09:35	.17	0	-	8.0°
			16	44°-26.2'	67°-51.2'	E. Shore Bois Robert Is.	1834	17:59	.68	0	-	10.3°
		50 fathoms bottom	17	44°-28.0'	67°-44.8'	Northern Pt. Nash Is.	1918	14:08	.92	2 herring	8.3"	9.0°
			18	44°-29.1'	67°-47.5'	Fleet Is. Harrows	1945	14:57	.81	-	-	10.5°
	6-28-56	50 fathoms bottom	19	44°-20.2'	68°-1.7'	Schoodic Island	1453	14:12	.Lo	6 herring	9.1"	9.8°
			20	44°-21.9'	68°-6.3'	Turtle Is., Tremblans Bay	1555	13:08	.22	1 herring	7.8"	11.0°
		50 fathoms bottom	21	44°-24.4'	68°-6.2'	Iron Bound Is., Tremblans Bay	1600	11:45	.38	-	-	11.0°
4	7-10-56	50 fathoms bottom	1	43°-49.1'	69°-35.6'	New Point, Fishermans Is.	1900	13:50	.81	2 herring	8.7"	14.0°
		50 fathoms bottom	2	43°-49.2'	69°-34.9'	Ocean Point Bay	1915	13:05	.17	0	-	14.0°
		25 fathoms bottom	3	43°-49.0'	69°-35.2'	NW Shore Lookin Rock	1956	11:45	.27	0	-	14.5°

NOTE FOR EXPLANATION OF FOOTNOTE SEE P. 14.

Table 3 - Fishing Log—W/V Metacomb 0111-Wet Sets, 1956 (Contd.)

Cruise No.	Date	Gear	Set No.	Set Location			Time Fished Started (Hrs.)	Tide Stage Start	Herring Catch	Avg. Std. Length	Surface Temp. (Contigrade)	
				Lat. N.	Long. W.	Geographical References						
4 (cont.)	7-15-56	50 fathoms bottom	4	43°-59.1'	68°-7.9'	W. Shore, Mt. Desert Rock	1915	13:00	.72	2 herring	9.4"	10.0°
	7-15-56	50 fathoms bottom	5	43°-57.7'	68°-7.8'	Shoal SE Mt. Desert Rock	1950	10:20	.72	3 herring	13.4"	11.0°
	7-15-56	50 fathoms bottom	6	43°-57.4'	68°-7.7'	0.7 mi. S Mt. Desert Rock	1954	11:55	.82	1 herring	12.8"	10.7°
	7-15-56	50 fathoms surface set	7	44°-0.2'	68°-7.4'	2 1/2 mi. NNE Mt. Desert Rock	Lost in storm					
	7-15-56	50 fathoms surface set	8	43°-56.8'	68°-6.8'	1 1/2 mi. SSW Mt. Desert Rock	Lost in storm					
	7-15-56	50 fathoms bottom set	9	44°-37.2'	67°-22.1'	Howard Cove, Machias Bay	2135	09:27	.72	10 herring	8.9"	11.0°
5	7-16-56	50 fathoms bottom	10	44°-37.7'	67°-21.6'	Jasper Head, Machias Bay	2150	07:30	.82	0	-	9.8°
	7-16-56	50 fathoms bottom	11	44°-38.9'	67°-21.6'	Yellow Head Is., Machias Bay	2210	06:50	.82	6 herring	9.1"	11.0°
	7-16-56	150 fathoms surface drift	12	44°-7'	67°-1.1'	Grand Manan Bank	2300	09:00	.82	0	-	10.5°
	7-17-56	250 fathoms surface drift	13	44°-32'	68°-36'	Proprietor Buoy Grand Manan Is.	2000	11:50	.22	8 herring	8.7"	9.0°
	7-19-56	250 fathoms surface drift	14	43°-51'	68°-36'	8 mi. NW Larcher Shoal	2040	08:20	Lo	0	-	10.0°
	8-1-56	150 fathoms bottom	1	43°-54.8'	68°-56.8'	1 1/2 mi. NW Matinicus Is.	1750	10:00	.92	0	-	14.0°
	8-1-56	2/100 fathoms surface-2 fms.-drift	2	43°-54.8'	68°-56.8'	1 1/2 mi. NW Matinicus Is.	1850	10:45	.92	22 herring	8.5"	14.0°
	8-2-56	100 fathoms surface-2 fms.-set	3	44°-13'	68°-45'	1/2 mi. SW Schoodic Is.	1955	11:25	.12	3 herring	10.0"	11.6°
	8-3-56	150 fathoms bottom	4	44°-13'	68°-45'	1/2 mi. SW Schoodic Is.	2000	12:15	.22	0	-	11.6°
	8-3-56	250 fathoms surface-2 fms.-drift	5	44°-25.1'	67°-14'	1/2 mi. SW Machias Seal Is.	1940	11:05	.92	0	-	10.0°
8-4-56	250 fathoms surface-2 fms.-drift	6	44°-10.4'	67°-5.2'	Grand Manan Bank	1910	10:40	.72	6 herring	9.6"	10.0°	
8-5-56	250 fathoms surface-2 fms.-drift	7	44°-1.8'	67°-37.2'	28.6 mi. SE Schoodic Is.	1910	11:27	.72	11 herring	10.2"	17.0°	
8-8-56	100 fathoms surface set	8	44°-4.4'	68°-26.2'	2 1/2 mi. S Swan Is.	1955	16:40	.92	0	-	12.0°	
8-9-56	150 fathoms bottom	9	44°-4.4'	68°-26.2'	2 1/2 mi. S Swan Is.	1955	16:40	.92	0	-	12.0°	
8-9-56	250 fathoms surface-2 fms.-drift	10	43°-35.6'	68°-27.2'	13 mi. SSW Vombogen Is.	1950	10:45	H	11	9.9"	15.5°	

1/2 CATCHES OF FISH OTHER THAN HERRING ARE OMITTED EXCEPT WHERE NOTED.  
 1/2 GILL-NET SETS MARKED SURFACE-2 FM. WERE SUSPENDED FROM BOOTS TWO FATHOMS BELOW THE SURFACE.

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## PROMOTIONAL IDEAS URGED

American housewives are ready to accept fish for added uses in home menu-planning if the product is packaged and merchandized to increase their interest, an Arkansas leader in the industry said in a statement to the National Fisheries Institute at its 12th Annual Convention.

"The opportunities are there, but it's all too easy to say, 'Well, it won't work' or 'maybe they can do it in your city but ours is different market,'" he stated.

He urged more original promotions, such as a Lenten one in Little Rock in which frozen fish sticks, breaded shrimp, and other fish products were displayed in a supermarket in a 12-foot row boat also containing macaroni and spaghetti items related to Lent.

Other successful ideas, he said, have included Thursday and Friday "saturation" spot announcements on local radio, 2½-pound family-size layer-packed boxes of breaded shrimp, coupon or straight nickel-discount promotions in stores, local participation in National Fish Week, cooperation with various food-freezer plans, furnishing products to home demonstration programs on local TV, providing menu clip-ons and back-bar material for restaurants, and selling breaded fish fillets and similar items to frozen-dessert stands and roadside restaurants for use in fish sandwiches.

## BODY FLUID LOSSES OF NORTHERN AND SOUTHERN OYSTERS<sup>1/</sup>

By Milton Fingerman,\* Laurence D. Fairbanks,\* and Warren C. Plauche\*

### PREFATORY ABSTRACT

THE PRESENT STUDY SHOWED THAT AS MUCH AS 69.5 PERCENT OF THE WEIGHT OF THE SOUTHERN OYSTER MAY BE LOST AS FLUID IN THE FIRST 60 MINUTES AFTER SHUCKING. TO ACQUIRE BASIC INFORMATION NEEDED IN THE CONTROL OF SUCH LOSSES, THE AUTHORS INVESTIGATED SEASONAL AND GEOGRAPHIC DIFFERENCES IN THE AMOUNT OF FLUID LOST FROM THE OYSTER AND ALSO STUDIED RELATIONSHIPS BETWEEN THE CONCENTRATIONS OF PROTEIN, SALT, AND CELLS IN THE BODY FLUIDS.

### BACKGROUND

The loss of body fluid is a problem of great economic concern to the oyster industry. Loss of fluid affects the appearance and the palatability of the oyster and causes serious difficulties related to the fill of container.

Investigation of the physiology of body fluid in the oyster *Crassostrea virginica*, which is the commercial species found along the East and Gulf coasts, has been in

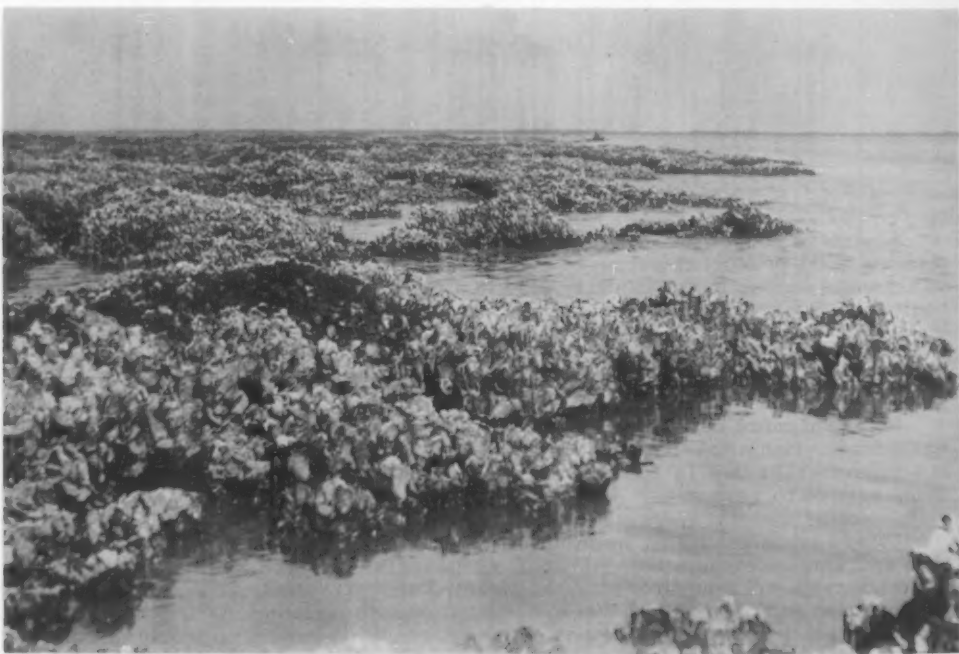


FIG. 1 - EASTERN OYSTERS EXPOSED AT LOW TIDE

progress for more than a year. Among the several phases that have been considered are losses due to injury and to heat shock. The present report summarizes re-

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<sup>1/</sup>THIS STUDY WAS CONDUCTED UNDER A CONTRACT BETWEEN TULANE UNIVERSITY AND THE UNITED STATES FISH AND WILDLIFE SERVICE WITH FUNDS PROVIDED BY P. L. 466, 83RD. CONGRESS, APPROVED JULY 1, 1954, COMMONLY CALLED THE SALTONSTALL-KENNEDY ACT.

cent experiments on the extent of loss of body fluid by Northern and by Southern oysters that were shucked in the spring and in the fall of 1956.

The idea that Southern oysters lose more body fluids at all times of the year than do Northern oysters has been accepted for a long time. No quantitative comparisons, however, have been made. The importance of the problem is that if Southern oysters "bleed" more and consequently shrink in size more than do their Northern counterparts, then for a given volume of shucked oysters, more Southern than Northern shell oysters of the same size would be required.

#### EXPERIMENTAL

Oysters were obtained from three sources: Louisiana (the vast majority were grown in Barataria Bay), Chesapeake Bay, and Delaware Bay, during the months of March and April, and of October and November in 1956. In 20 of the 22 experiments that were conducted, the oysters were placed in sea-water aquaria to allow them to acclimatize to the sea water for at least 24 hours prior to shucking. In the other two instances, oysters were shucked on the day of arrival at the laboratory.

Each experiment was performed as follows: Bodies of 19 oysters were removed from their shells and placed in individual containers. Initial body weight, including the fluid escaping through ruptures in the mantle, was determined. The bodies, without the fluid that escaped, then were weighed at intervals. Weights were expressed as percentages of the original body weight.

#### RESULTS AND DISCUSSION

Data for oysters from each locality, averaged according to season, are present in table 1. In the spring, practically no difference was found between Northern and

Table 1 - Relation Between Geographical Source, Season, and Body Weight of Oysters 60 Minutes after Shucking

Geographic Source	Body Weight 60 Minutes After Shucking	
	In the Spring	In the Fall
	... (Percentage of Original Weight) ..	
Delaware Bay .....	54.4	57.1
Chesapeake Bay .....	51.3	40.8
Louisiana .....	53.5	30.5

Southern oysters. In the fall, however, striking differences appeared. Louisiana oysters lost considerably more weight than did Chesapeake oysters, and Chesapeake oysters, in turn, lost considerably more weight than did the Delaware oysters. Thus, in the fall, the farther north the habitat of the oyster in the areas studied, the smaller was the loss of body fluid when shucked and drained.

The composition of body fluid was found not to be uniform in all parts of the oyster. The fluid does not simply flow from one part of the body to another. Differences in concentration of protein, salt, and number of cells in fractions of the body fluid taken from different portions of the body support this contention. The amount of protein in the fluid was correlated positively with the salt content. Oysters having fluids with the greatest concentration of protein tended to have the highest concentration of salt. The most cells, for example, were found in the blood taken directly from the heart (1,715 per cubic milliliter), and the fewest were found in the pericardial fluid (348 per cubic milliliter). Cells comprised less than 0.1 percent of the volume of body fluid.



## SUMMARY AND CONCLUSIONS

Loss of body fluid from the oyster is of great economic concern to the oyster industry. The present study showed, for example, that as much as 69.5 percent of the weight of the oyster Crassostrea virginica may be lost as fluid in the first 60 minutes after shucking.

Study of physiology of body fluid in this oyster, which is the commercial species found along the East and Gulf coasts, showed that:

1. In the spring, practically no difference was found between Northern (Delaware Bay and Chesapeake Bay) and Southern oysters (primarily from Barataria Bay, La.) in the amount of body fluid lost.

2. In the fall, Louisiana oysters lost considerably more weight than did Chesapeake oysters, and the Chesapeake oysters lost considerably more weight than did the Delaware oysters.

3. Oysters with the greatest concentration of protein in the fluid usually had the highest concentration of salt.

4. In a comparison of the various portions of the body of the oyster, the most cells were found in blood taken from the heart (1,715 per cubic milliliter); and the least, in the pericardial fluid (348 per cubic milliliter).

5. Cells comprised less than 0.1 percent of the volume of body fluid.

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## IRISH MOSS

Experiments conducted in Canada on the continuous co-current extraction of Irish moss have shown that 80 percent of the total soluble solids in Irish moss can be extracted with a contact time of 8 minutes and a temperature of 194° F. (90° C.). The percentage extraction increased with increasing temperature, but temperature of extraction did not influence the quality of the product. The continuous co-current method of extraction is regarded as satisfactory.

--Eighth Annual Report of the Nova Scotia Research Foundation, 1955.



# RESEARCH

## IN SERVICE LABORATORIES



### COMPARATIVE STUDY OF FRESH-WATER AND SALT-WATER ICE AS PRESERVATIVES FOR HADDOCK

Salt-water and fresh-water ice were used in comparative preservation studies to ice representative lots of eviscerated haddock aboard the Service's exploratory fishing vessel, Delaware. No significant differences in preservative effects were noted. The relative cooling rates, storage temperatures, and keeping qualities of the fish stored in the respective ices were determined.



FIG. 1 - CHECKING THE TEMPERATURE OF HADDOCK WITH A MERCURY THERMOMETER.

The fish stored in salt-water ice and in fresh-water ice under laboratory conditions were of excellent to good quality until the 9th day of iced storage, and of acceptable quality from the 9th until the 13th day of iced storage. The fish stored in salt-water ice were cooled faster than the fish stored in fresh-water ice. However, the salt-water ice melted faster than the fresh-water ice and left the fish with less protecting ice. Therefore, since melted

ice was not replaced, the fish in salt-water ice eventually rose to a higher temperature than those stored in fresh-water ice. These results show that in order to maintain fish in salt-water ice at a temperature close to the melting point of this ice, sufficient quantities of ice must be used to compensate for the faster melting rates. A comprehensive report of the study is expected to be published shortly.



## STANDARDS

**BREADED SHRIMP STANDARDS MEETING AT NEW ORLEANS:** A public conference on the proposed voluntary standards for frozen raw breaded shrimp was held on July 1, 1957, in New Orleans, La.

The conference was held at the request of a number of breaded shrimp producers, for discussion and clarification of the proposed standards. Persons interested were invited to attend or submit written comments.

A Bureau of Commercial Fisheries technologist opened the meeting with a brief review of the intent of the voluntary standards and the official procedure for the development and promulgation of such standards.

Announcement of the proposal to issue voluntary standards for frozen raw breaded shrimp was carried in the Federal Register of May 18, 1957. The notice provided for a 60-day period during which interested persons could submit written views, data, or arguments in connection with the proposals. Written comments received prior to June 28 were considered as part of the agenda at the New Orleans meeting.



FIG. 1 - DRAINING OF SHRIMP AFTER DEBREADING PROCESS DURING THE GRADING OF BREADED SHRIMP.



## ISINGLASS FROM FISH SOUNDS

Isinglass is a gelatinlike substance which has several commercial uses. Swollen in water and then in wine, it is strained through cheesecloth into a cask of wine. As it sinks to the bottom, it entangles the particulate matter which is responsible for producing clouded wines of inferior quality. A single ounce of isinglass can clarify 200-500 gallons of wine in 8-10 days. It is also used in the manufacture of plaster, special cements, and is a constituent of various water-proofing compounds.

Fish sounds, from which isinglass is made, are the swim bladders of fishes.

--Sea Secrets, The Marine Laboratory,  
University of Miami, Coral Gables, Fla.

# TRENDS AND DEVELOPMENTS

## California

**DUNGENESS CRAB ABUNDANCE OUTSIDE COMMERCIAL RANGE STUDIED**  
(M/V *Nautilus* Cruise 57-N-4): To determine the abundance, condition, and sizes of the Dungeness crab (*Cancer magister*) in areas on the outer edge and beyond the commercial range and to obtain samples of various size crabs by beam trawling was the purpose of a cruise (May 13-31, 1957) by the California Department of Fish and Game Research vessel *Nautilus*.

A total of 45 commercial-size crab traps were used to make trap sets. The traps were set in two strings of 21 and 22 traps each, except at the first station where 45 were set. Two traps were lost due to several days of rough weather.

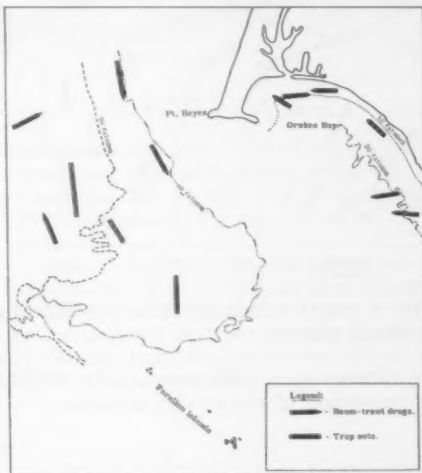
An eight-foot beam trawl with a 1-inch mesh net was used to catch crabs of the various sizes present.

A total of 174 trap sets were made in the Pt. Reyes and Farallon Island areas. These sets yielded 556 Dungeness crabs (known locally as market crabs). Of these 329 (59.2 percent) were legal (7" males), 127 (22.8 percent) were sublegal males, and 100 (18.0 percent) were females. The percentage of legal-size crabs per trap ranged from a low of 44.4 percent at a 36-fathom station SE. of the Farallon Islands to a high of 90 percent at a 45-fathom station North of the same Islands.

Very few soft legal crabs were encountered. Only 4 of 329 legal-size (1.2 percent) were in the soft condition.

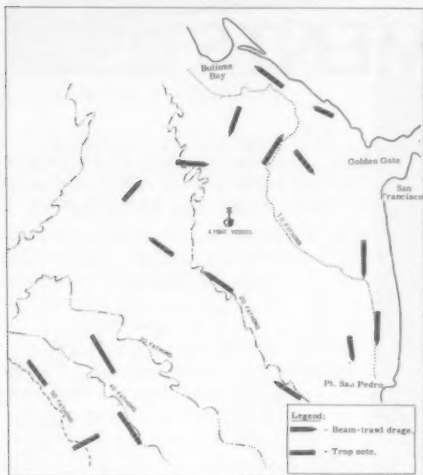
Various incidental species were also brought up in the traps. Among these were 119 sand dabs (*Citharichthys sordidas*) caught in 49 fathoms of water between Pt. Reyes and the Farallons. Two octopi were also caught during the cruise. These weighed approximately 30 to 40 pounds. Shoulder-width measurements were made on all crabs caught by the traps. A shoulder-width measurement is made just forward of the last antero-lateral spines.

It appears that from the amount of legal crabs caught, it is doubtful that commercial fishing in most of these areas would be profitable as late in the season as May. The catches of crabs were spotty around the 50-fathom depth. Not until the traps were set in approximately 40 fathoms of water did the catches pick up. Catch samples of commercial boats during the same period revealed that the fishermen were getting slightly more legal crabs per trap. These crabs averaged about the



M/V *Nautilus* Cruise 57-N-4 (May 13-31, 1957).

same size as those caught on this cruise. The fishermen were fishing in 10 to 12 fathoms of water off San Francisco (between the Golden Gate and Pt. San Pedro). An outstanding difference in the catches between the two areas was that the fishermen were handling many more females for a given amount of males.



M/V Nautilus Cruise 57-N-4 (May 13-31, 1957).

feet of water produced some crabs in the 30-69 mm. range. These sizes could not be found elsewhere.

These data with previously collected information will be used in studies of the composition of the crab resource.

\* \* \* \* \*

#### RESEARCH ON THE RED ABALONE IN MORRO BAY-SAN SIMEON AREA

(M/V Nautilus Cruise 57-N-3): Red abalone (*Haliotis rufescens*) beds off California were inspected by the California Department of Fish and Game research vessel *Nautilus* (April 24-May 12). Also, the vessel looked for abalone tagged during 1955 and 1956; and attempted to develop methods of collecting abalone spat and transporting and transplanting techniques.

Due to a siege of particularly bad weather curtailing diving activities during the month of May, only a limited number of the planned projects were accomplished.

Of the commercial areas inspected, the majority of the abalone observed appeared to have grown less in size than usual. In the area between Pt. Estero and San Simeon, the kelp which has in recent years been present in large scattered beds, is this year almost completely absent. No young stalks were seen growing from the bottom. This kelp provides the principle source of food for the abalone in this area.

Four tagged abalone were recovered by divers in approximately the same area of release. One abalone had grown slightly more than one inch during the year, the others had grown very little if at all during the same period of time.

Examination of the gonads indicated the abalone were retarded in spawning development so plans for collecting spat were postponed.



Seventy abalone were collected and placed in a live box and the box deposited in the inner harbor of Morro Bay. Twelve abalone injured when collected died within a few days. The others have remained alive and are in good health, feeding only on the materials which float into the box. The 58 abalone in the holding box have remained alive for 40 days.

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**ALBACORE TAG RETURNS TELL STORY OF WIDE TRAVEL:** The catch of two more albacore tuna tagged by the California Department of Fish and Game has shed more light on the ocean movements of these fish. Tags from both fish were recovered off Lower California by the fishing vessel Jessie A out of San Diego.

The first albacore, caught 90 miles south of San Diego on July 3, established a new albacore record for being "at liberty." It had been tagged July 25, 1955, and was recovered 710 days later. The previous record was one year.



Albacore Tuna

Department spokesmen said this demonstrates that any given albacore may appear in the local fishery for at least three successive seasons. They theorize this fish could have made two round trips to Midway Island, or one long round trip to Japan. It had gained 13½ pounds while at liberty, weighing 25¼ pounds when caught.

The second fish, at liberty 306 days, was caught July 5 at 100 miles southwest of San Diego. It had been tagged September 3, 1956, off Monterey, Calif., in a group of 76 albacore, which included an albacore recovered only one month earlier (June 1) approximately 145 miles east of Tokyo. These fish, caught 5,000 miles apart, were only five fishes away from each other in sequence when they were tagged in the group of 76.



### Cans--Shipments for Fishery Products, January-April 1957



Total shipments of metal cans for fish and shellfish canning during Jan.-May 1957 amounted to 54,426 short tons of steel (based on the amount of steel consumed in the manufacture of cans), compared to 44,486 short tons in Jan.-May 1956. Firms canning tuna, shrimp, Pacific mackerel, jack mackerel, and anchovies were active during the month. Packers of Maine sardines and salmon had started the 1957 season, but packs were light in May.

NOTE: STATISTICS COVER ALL COMMERCIAL AND CAPTIVE PLANTS KNOWN TO BE PRODUCING METAL CANS. REPORTED IN BASE BOXES OF STEEL CONSUMED IN THE MANUFACTURE OF CANS, THE DATA FOR FISHERY PRODUCTS ARE CONVERTED TO TONS OF STEEL BY USING THE FACTOR: 23.0 BASE BOXES OF STEEL EQUAL ONE SHORT TON OF STEEL.



### Crabs

**BLUE CRAB STUDIES INTENSIFIED:** Plans for an expanded study of blue crabs, to be financed by the Federal Government, were discussed recently at a three-day conference between the Virginia Fisheries Laboratory, Gloucester Point, Va.,

recently, and the Oyster Institute of North America. A biologist at the conference pointed out: "The blue crab industry has suffered periodically from both over-production and shortage of crabs. Seventy-five thousand dollars of Federal funds,



recently set aside for crab research, is to be applied to a study of the causes of the wide variations in the catch of blue crabs along the Atlantic coast." Funds for this work are made available by the Saltonstall-Kennedy Act of 1954. The U. S. Fish and Wildlife Service has contracted with the Oyster Institute of North America to carry out some fundamental studies of the effects of certain environmental elements such as temperature, light, the amount of salt in the water, and food on the hatching, growth, and

survival of small crabs. A research group, with headquarters at the U. S. Fish & Wildlife Service Fisheries Laboratory in Beaufort, N. C., will conduct field investigations from Delaware to Florida.

The contract was awarded as the culmination of almost two years of planning by state and Federal biologists in cooperation with some of the leading crab meat packers and canners. An advisory group has been appointed for this project.

Funds have also been allocated to the University of Maryland Seafood Processing Laboratory, Crisfield, Md., for studies of the cooking, processing, and storage of crab meat.

The Acting Chief Scientist of the Oyster Institute recently visited the Virginia Laboratory and other laboratories along the Atlantic seaboard to review the work which has been already done and to exchange ideas on methods of holding and handling crabs for experimental purposes.



## Films

HINTS TO HOUSEWIVES TOPIC OF PROPOSED FISHERY FILMS: Hints to housewives on how to buy fish will be given pictorially in a 14-minute, 16-mm. sound-color film just placed under contract by the Bureau of Commercial Fisheries, according to a July 26 announcement. The film, which will be ready for distribution in mid-1958, is one of a series to encourage the consumption and marketing of fish and shellfish. The picture, Fish for Sale, is being produced by the Bureau of Commercial Fisheries of the United States Fish and Wildlife Service as part of its market development program. The filming will be done by Milner Productions Inc. of Baltimore, Md. This firm will supply 125 prints to be distributed through the Bureau's film libraries.

A contract for another market promotion film, Outdoor Fish Cookery, has been awarded to the Sun Dial Films of New York City. It will be a 28-minute, 16-mm. sound-color picture. The contract also includes 125 prints for Bureau distribution. Outdoor Fish Cookery will be ready for distribution in about a year. Subjects portrayed will be an Indian salmon barbecue, a New England lobster boil, a Gulf shrimp boil, a South Atlantic oyster roast, and other traditional events, with hints to present-day arrangers of such outside events.

Both films will be financed from funds made available by the Saltonstall-Kennedy Act of 1954 to aid in the production and marketing of domestic fish and fish products.

The Bureau has produced 14 fishery films, six of which have been financed by segments of the fishing industry. Seven Bureau films have won international honors at European film expositions.



## Florida

**FISHERIES RESEARCH, APRIL-JUNE 1957:** The following are some excerpts from the Quarterly Report on Fisheries Research, June 1957, of the Marine Laboratory of the University of Miami.

**Tortugas Shrimp Fishery:** The analysis of shrimp dealers' records was continued. Excellent records of shrimp sales during the years 1950 through 1956 were obtained from a Key West dealer and are being processed. Two boats which fished continuously during these years were used for a preliminary examination of the catch per unit of effort during the early years of the fishery. This very sketchy data shows that during the entire period the pounds per boat per night landed did not vary greatly. During the early years of the fishery the catch rates were not much higher than those made by the same and other boats in the later years. An interesting aspect of the trend of these catch rates from 1950 through 1953 is that they follow the production curve rather closely. After 1953 they have a downward trend as do those of the other dealers. It is possible that the catch per boat per night up to a certain point reflects abundance of shrimp on the grounds and above this point the rate of capture does not reflect abundance because it involves competition between units of gear.

The numbers of shrimp discarded by fishermen at sea is a very important aspect of the analysis of the dealers' records. Because records show sizes of shrimp sold and not those actually landed on deck, the relationship between the two figures must be determined so that sales records may be converted to the sizes of shrimp actually landed on deck. The best estimate of the amount of discard comes from samples taken on board a charter vessel. On several cruises a random sample of shrimp in the cod end of a 2-inch stretched measure net was measured and the skipper then culled and sold the catch. For example, the month of February 1956 shows that the fishermen discarded 36 percent by numbers of shrimp. Of course this must be done with nets of different mesh sizes at all times of the year for many boats to obtain figures that can be studied for reliability.

In order to gain information concerning the spawning of the Tortugas pink shrimp, three methods are being used: (1) ova diameter frequency, (2) gross appearance of male and female gonads, and (3) the ratio of gonad weight to total weight.

Although it is possible that the pink shrimp spawns more than once no conclusive evidence has been found yet.

The sex ratio (males to females) during the months of January, February, and March was 1.29 to 1.00. This sex ratio does not appear to be the result of gear selectivity because the larger shrimp (the females) would be more susceptible to being caught and in the catch would outnumber the males.

On the other hand it is possible that the number of females in the population has been reduced because they are more available to the gear.

**Spotted Sea Trout:** A current study of the statistics of commercial landings of black mullet and spotted sea trout show clearly that the sea trout catches were, in large measure, dependent on catches of mullet prior to the year 1952. Since that time, however, the advent of the sport fisherman as a potent factor in the fishery, has made interpretation of landing statistics more difficult.

There has been a decided shift from the mullet fishing which formerly supplied much of the spotted sea trout reported in commercial landings statistics. An unfavorable market situation has lowered the demand for Florida east coast black mullet. The result appears to have been a shift of the mullet netter to other species which are capable of sustaining a paying fishery. The sea trout, the spot, the menhaden, and various species labeled as "bottom fish" now make up the bulk of catches taken in inshore waters. Analysis of this shift in fishery emphasis is being undertaken in an attempt to anticipate the results of much increased pressure on species such as the spotted sea trout.

**Black Spot Control in Shrimp:** Recent experiments with sodium bisulfite have shown the chemical to be effective at the low concentration of 0.5 percent in retarding the development of black spot. The results with 0.5 percent concentration show that the lower concentration was not quite as effective as the concentration now in general use (1½ percent) but show that a very weak solution is still useful in controlling black spot.

Studies were continued to determine the effect of Ionol (Butylated hydroxy toluene) on black spot. Results from further tests with dipping solutions of Ionol indicate that a change in the pH using citric acid has no noticeable effect on the rate of black spot formation, and in some cases a slight increase was noticed. Further tests are planned using phosphoric and ascorbic acid to change the pH.

**Spoilage Control in Shrimp:** Studies were continued to determine the preservative action of the antibiotic Terramycin when applied in a dipping solution. A second trip was made in May on a shrimp boat out of Key West, and samples of pink shrimp (*Penaeus duorarum*) were dipped in four concentrations of a Terramycin-sea water solution. Concentrations ranged from 30 to 500 parts per million; samples were dipped for 1, 5, and 15 minutes.

Organoleptic scores (taste and odor) and black spot evaluations showed small and probably insignificant differences with the nontreated samples. A slight improvement in taste was noted at the 100-parts-per-million level for all of the dipping times. Black spot scores showed that Terramycin in general has a slight retarding action on the development of black spot. This was especially noticeable at the 10-parts-per-million level.

Bacterial counts from this series of tests have not yet been completed. The results will be available early in July.

**Rancidity in Fish:** A second series of tests to control the development of rancidity in frozen fish (Spanish mackerel) were begun. The experiment was designed to provide information on the prevention of rancidity by the use of Ionol applied either as a dip or as a glaze. The mackerel used in the tests were obtained in Riviera Beach, Fla. Each sample (consisting of 16 fillets) was dipped for one minute in three gallons of freshly-prepared Ionol emulsion, packed in a five-pound waxed carton, and frozen at -10° F.

Those samples which received a glaze were treated after they were completely frozen. The entire carton was submerged in the solution for one minute, drained for a few seconds, and return-

ed to the freezer. Concentrations of Ionol ranged from 150 to 500 parts per million. The effect of 0.5-percent citric acid when applied alone or in combination with 250 p.p.m. Ionol is also being studied. Results from these tests will be reported at a later date.

A second series of tests to prevent the fading of the red pigment on red snappers was also begun. Previous experiments have shown that Ionol in the range of 200-300 parts per million was quite effective in preventing fading of the color. The present experiment was designed to provide confirmatory data on the effect of Ionol on the fading of the red pigment. Concentrations ranged from 50 to 500 parts per million. The effect of sodium bisulfite, lecithin, ascorbic-citric mixtures, and glycerin are also being observed. Results from these tests will be reported later.

**Smoked Fish Mold Studies:** Mold develops on smoked fish held under room temperatures in from 7 to 10 days. Previous work has shown that smoked fish wrapped in Mylar 322 containing carbon dioxide showed no mold after 21 days of storage.

A second series of tests using Mylar 322 and carbon dioxide gas produced similar results after 30 days of storage. A slight "souring" was noticed at this time, however.



## Fisheries Loan Fund

**INTERIOR WILL CONTINUE TO ACCEPT APPLICATIONS:** Applications for fishery loans will continue to be accepted and assigned case numbers for an indefinite period, despite the fact that applications exceed the \$10,000,000 provided by Congress as initial capital for a fishery loan fund, it was reported June 14 by the Department of the Interior.

Only a limited number of applications in excess of the \$10,000,000 will be investigated or further processed at this time. Applications not processed will be held by the Department until funds again become available. Applications are handled in the order in which they are received.

The \$10,000,000 fisheries loan fund is a revolving fund set up by Congress for a ten-year period to provide loans to commercial fishermen for financing and re-financing of operations, maintenance, replacement, repairs, and equipment of fishing gear and vessels and for research into the basic problems of the fisheries.



## Great Lakes Fishery Investigations

**OTTER-TRAWL AND GILL-NET FISHING IN LAKE ERIE BY M/V "CISCO:"** Experimental otter trawling and gill-netting were tried by the Service's research vessel Cisco in Lake Erie during several cruises.

**Cruise 2--May 21-June 3:** The Cisco's entire operations during cruise 2 were conducted in the eastern end of Lake Erie off Erie, Pa., and Port Dover, Ontario, except for two series of bathythermograph casts between Sandusky, Ohio, and

Erie, Pa., and two trawl hauls off Cleveland, Ohio.

Yearling yellow perch, 3½ to 4½ inches long, predominated in the trawl samples off Cleveland. In a total of 30 minutes towing time, 1,352 of these



fish were caught. Also abundant were smelt (594), logperch (301), and emerald shiners (545). Represented in small numbers were adult perch, sheepshead, spot-tail shiners, and silver chubs.

Experimental nylon gill nets (mesh sizes 1-, 1½-, 2-, 2½-, 3-, 4-, 5-, and 6-inch) were set on the bottom in 13 fathoms off Erie and in 34 fathoms (the deepest area in Lake Erie) off Port Dover.



The Service's research vessel M/V Cisco.

The catch off Erie was light and consisted entirely of perch and smelt, except for one burbot and 2 blue pike. The catch off Port Dover was extremely light, consisting of only 1 smelt, 1 burbot, and 1 *Leucichthys* sp., tentatively identified as either *L. alpenae* or *L. johannae*. This latter specimen is interesting in that neither of these two species is generally listed as occurring in Lake Erie, although there is one recent report of *L. johannae* having been taken from the deeper waters.

Gill nets (2½-inch mesh) were set obliquely from top to bottom in 13 fathoms off Erie and 26 fathoms off Port Dover, and a bull net (300 feet long, 2½-inch mesh, 120 meshes deep) was set with its floats 6 feet below the surface in 13 fathoms off Erie. The oblique net off Erie caught 1 white bass and 1 smelt near the surface and 29 yellow perch and 1 blue pike near the bottom. Six smelt and 2 white bass were taken in the bull net. In the oblique net off Port Dover there were 3 perch, 4 smelt, and 2 white bass near the top half of the net and one lake herring near the bottom.

Trawling operations were carried out in 4 areas off Erie in depths ranging from 3 to 16½ fathoms and in 3 areas off Port Dover in depths ranging from 2½ to 33 fathoms. The most outstanding feature of the trawling was the exceptionally large catches of 3- to 4-inch smelt in nearly all tows. Up to 7,500 of these smelt, believed to be yearlings, were taken in a single 20-minute tow. They seemed to be abundant in bottom tows at all but the greatest depths. In the deep water, a large catch was made at midwater levels (about 7 fathoms below the surface). Fathogram tracings indicated that they were very abundant from 6 to 10 fathoms below the surface in this area. Catches of all other species were generally small, except for a single catch of about 400 yearling perch (3 to 4 inches), taken in shallow water off Erie. The young perch in this area averaged about one-half inch shorter than those off Cleveland. Other species taken in trawls include blue pike, adult smelt, adult perch, burbot, sheepshead (2), lake herring (1), white bass, walleye (1), alewife (1), spoonhead muddler, slimy muddler, trout-perch, spot-tail shiner, emerald shiner, logperch, johnny darter, brindled madtom, black crappie (2), and rock bass (2). The latter two species were taken in very shallow water off Erie. Otherwise, catches from

the two sides of the lake did not differ greatly at comparable depths. No blue pike, however, were caught on the north side. An interesting feature of the perch catch was that practically all adults were males and appeared to be in spawning condition, although there seems little doubt that the spawning season has ended.

Seine hauls in 3 areas in and near Erie Harbor failed to produce fry of any species. A half-meter plankton net towed at night at the surface off Port Dover, however, caught several smelt fry. This tow also took several large *Pontoporeia* which had no doubt migrated to the surface after dark.

The water in the east portion of Lake Erie was only slightly stratified thermally and was generally still cold. Surface water ranged from 7.0° C. (44.6° F.) over the deep-water area to 16.6° C. (61.9° F.) off Erie.

**Cruise 3--June 11-23:** Both otter trawling and gill-netting in the extreme western end of Lake Erie were tried during cruise 3. Operations were conducted as far west as Lorain, Ohio, on the American side and Point Pelee on the Canadian side. Ports visited by the vessel included Sandusky and Put-in-Bay, Ohio, and Leamington, Ontario.

Gill nets of several mesh sizes (1-inch to 6-inch) were set on the bottom in 6 fathoms of water east of Pelee Island and at the surface over 6½ fathoms of water east of Kelly's Island. In each of these areas a gill net (2½-inch mesh) was also set obliquely from top to bottom. Yellow perch made up practically the entire catch in the oblique set off Pelee Island. Few perch were caught in the uppermost one-quarter of the net, but they were increasingly abundant with depth. Other fish taken were 3 smelt, one sheepshead, and one blue pike. The blue pike and one smelt were near the bottom, the others at midlevels. Yellow perch were extremely abundant in the net set on the bottom in the same area; 251 were taken in a 100-foot section of 2-inch mesh. Other species caught in small numbers were sheepshead, smelt, blue pike, white sucker, one rock sturgeon, trout-perch, and spottail shiner, the latter two species in 1-inch mesh. Sheepshead (61) and perch (42) predominated in the oblique net set off Kelly's Island. The sheepshead were most abundant at midlevels while the perch were concentrated near the bottom. Other species, scattered mostly in the top three-quarters of the net, included blue pike (5), smelt (14), white bass (3), and walleye (2). The surface net set off Kelly's Island contained the same species in a similar distribution pattern as the oblique net, with the addition of three channel catfish.

Trawls were towed in two areas off Leamington and four areas between Put-in-Bay and Lorain. Small smelt (average length about 4 inches) dominated nearly all catches where a small-mesh cod end was used. They were often as abundant at midwater levels as on the bottom. Over 9,000 small smelt were taken in one 10-minute tow. Perch yearlings (also averaging about 4 inches in length) were second most common, but were generally on the bottom. There were no striking differences in catches at comparable depths in the different areas. Minnows and darters were more numerous in the shallower waters, but otherwise depth seemed to make little difference in the catches. It must be pointed out, however, that depths at which trawls



were towed varied only from 3 to 7 fathoms. In addition to the large numbers of small smelt and perch caught in the trawls, fair catches of large perch and small catches of large smelt were made. Other species represented were sheepshead, blue pike, walleye, trout-perch (very numerous at times), white sucker, white bass, channel catfish, spottail shiner, emerald shiner, channel darter, sand darter, logperch, alewife (only 2), silver chub (only 5, found in only two areas), burbot, stonecat, and brown bullhead (only 1).

Midwater trawling operations at night south-east of Kelly's Island took very few fish at the surface, but were more successful at midlevels. Results of this trawling indicate that many of the species of fishes in Lake Erie may be found well off the bottom soon after dark.

A few smelt fry began showing up in the small-mesh trawls, and some very tiny fry (probably cyprinids) were caught near the surface in plankton nets. The first young-of-the-year perch were taken in seining operations near Sandusky.

Most of the deeper water of the western end of Lake Erie was stratified thermally during cruise 3, with the discontinuity layer generally near the bottom. Surface water temperatures ranged from 15.3° C. (59.5° F.) to 24.3° C. (75.7° F.). The water was clearer than during cruise 1, with secchi disc readings 6½-8½ feet, 2-5 feet greater than readings made during the earlier cruise.

**Cruise 4--July 2-15:** Operations during cruise 4 were carried out primarily in the east end of Lake Erie off Erie, Pa., Dunkirk, N. Y., and Long Point, Ontario. Some fishing, however, was done off Ashtabula, Fairport, and Cleveland, Ohio.

Nylon gill nets (graded mesh sizes, 1 to 6 inches) were set on the bottom off Long Point in 33 fathoms and off Erie (3½-, 4-, 5-, and 6-inch mesh) in 9½ fathoms. The gang off Long Point took only one fish, a smelt. Apparently this deepest portion of Lake Erie is practically devoid of fish at the bottom at this time of the year. Oxygen was found to be ample (10 p.p.m.) near the bottom in this area. The bottom gill net off Erie contained 6 whitefish and 14 burbot in the 3½-inch mesh, 1 whitefish and 7 burbot in the 4-inch mesh, and 1 burbot in the 5-inch mesh. All meshes caught a few smelt. The whitefish were very close in weight to the legal minimum limit of 1½ pounds in Pennsylvania. Another gill net (1-, 1½-, 2-, 2½-, and 3-inch mesh) was set off Erie with its float line 1½ fathoms beneath the surface in 13 fathoms of water. This net took only 3 blue pike and 1 small yellow perch.

Nylon gill nets (2½-inch mesh) were also set obliquely from top to bottom in 13 fathoms off Erie and 26 fathoms off Long Point. The net off Erie contained 44 smelt, scattered from 20 feet below

the surface to the bottom, and 2 yellow perch and 2 lake herring at midlevels. The oblique net off Long Point took 10 smelt scattered from 40 feet below the surface to the bottom, plus 4 perch and 2 herring at midlevels.

Trawl hauls were made off Erie, Dunkirk, Long Point, Ashtabula, Fairport, and Cleveland. Smelt continued to dominate practically all catches. Larger smelt (older than yearlings) have, since cruise 2, become better represented in catches in the eastern portion of the lake, except in the very deepest water where they remain rather scarce. Presumably these fish move eastward to avoid the very warm water in the shallow western section of the lake. Most of the large smelt seem to stay near the bottom, at least during the daytime, while the yearlings tend to concentrate in the area of the thermocline, where there is one.

There are, however, some yearlings on the bottom even when there is a thermocline, and there is evidence that these individuals average somewhat longer than those at the thermocline. A few smelt fry were taken in bottom tows but a catch of about 600 in 7 fathoms off Cleveland represented the only sizable catch.

Whitefish were taken in the trawls for the first time this year--29 were caught off Long Point and seemed to be most abundant at about 7 fathoms.

Other species caught in the trawls in large numbers were yellow perch, trout-perch, and spottail shiners. Less common species included blue pike (14 caught in one tow off Fairport, otherwise uncommon), walleye, white sucker, lake herring (unidentified *Leucichthys* sp., possibly *L. alpenae*), slimy muddler, smallmouth bass, emerald shiner, silver chub, logperch, johnny darter, sand darter, and sheepshead. Seventy-six sheepshead were taken in two tows off Cleveland, otherwise they were rare. Most of the male sheepshead appeared ripe, and the larger females nearly so.

A sharp thermocline has developed in most portions of the central and eastern basins of Lake Erie. The thermocline is generally at about 9 fathoms. In water shallower than this there is little thermal stratification. Surface water temperatures ranged generally from 16° to 18° C. in the deeper water of the east end of the lake, with a low of 15.3° C. (58.7° F.). Maximums near shore reached 22.5° C. (72.5° F.) in the east end of the lake and somewhat higher in the middle and western parts. The water in the central portion was by far the clearest yet seen this year, with secchi disc readings up to 20 feet.

A special light penetration study was conducted in deep water near Long Point. It was found that very little light of any color penetrated to a depth greater than 15 meters where the secchi disc reading was 4.3 meters.

Note: Scientific names of species mentioned: yellow perch (*Perca flavescens*), smelt (*Camarus mordax*), sheepshead (*Aplodinotus grunniens*), blue pike (*Stizostedion vitreum glaucum*), white sucker (*Catostomus commersoni*), rock sturgeon (*Acipenser fulvescens*), trout-perch (*Percaopsis omiscomaycus*), spot-tail shiner (*Notropis hudsonius*), white bass (*Lepomis chrysops*), walleye (*Stizostedion vitreum vitreum*), channel catfish (*Ictalurus lacustris*), emerald shiner (*Notropis atherinoides*), channel darter (*Cottogaster copelandi*), sand darter (*Ammocrypta pellucida*), logperch (*Percina caprodes*), alewife (*Pomolobus pseudoharengus*), silver chub (*Hypobopsis storerianus*), burbot (*Lota lota*), spoonhead muddler (*Cottus ricei*), slimy muddler (*Cottus cognatus*), stonecat (*Noturus flavus*), brown bullhead (*Ictalurus nebulosus*), johnny darter (*Etheostoma nigrum*), brindled madtom (*Schilbeodes mirus*), black crappie (*Pomoxis nigromaculatus*), rock bass (*Ambloplites rupestris*), whitefish (*Coregonus clupea formis*), lake herring (*Leucichthys artedii*), smallmouth bass (*Micropterus dolomieu*).

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SEA LAMPREY CONTROL REPORT LISTS RESULTS OF CHEMICAL TESTS:

Painstaking routine and faithful observation were employed by Fish and Wildlife Service scientists in the all-out attack on the sea lamprey, Assistant Secretary of the Interior Ross L. Leffler said when he released Special Scientific Report--Fisheries No. 207--Toxicity of 4,346 Chemicals to Lamprey and Fishes.

The goal of this phase of the campaign against the sea lamprey was to find a substance toxic to lamprey larvae but harmless to fish.

The report, strictly uninteresting to the casual reader but full of information for the industrial chemist, toxicologist, physiologist, fishery scientist, and others with scientific interest, is largely an alphabetical listing of each chemical tested with its effect on specimens of lamprey larvae, trout, and bluegills, beginning with acetaldehyde and ending with zinc silicofluoride.

Opposite the name of each chemical is the result of each 24-hour test, showing either negative results or the time necessary to kill or otherwise affect the objects of the test.

In addition to the 3,939 named chemicals there is a list of 407 compounds submitted by chemical companies but identified only by the company's own code.

The Fish and Wildlife Service researchers have discovered two chemicals which, in the laboratories, will kill lamprey larvae and not harm fingerling trout and young bluegills. These are being given rigid tests in the streams before definite pronouncements of their value will be made.

Sea lamprey showed up on Lake Huron more than 20 years ago and then moved into Lake Michigan. In each lake the lamprey has ruined the commercial trout fishery. In Lake Michigan the annual trout harvest dropped from 6,500,000 pounds in 1946 to a mere 34 pounds in 1955. In recent years the lamprey has entered Lake Superior and is seriously damaging the trout resource there.

The program to control the sea lamprey has developed along two major lines--the use of electric fences to kill adult lamprey as they attempt to enter their spawning streams, and the project to find a selective poison which will kill only lamprey larvae.

Lamprey larvae remain in the bottoms of the streams for six years before becoming adult marauders which ruin lake trout fisheries. Hence, a successful poison plus the electrical blockade should rapidly reduce the lamprey population and aid in the rebuilding of the trout resources.

Canada and the United States and the affected Great Lakes States and Provinces are working cooperatively on the lamprey program under the direction of the Great Lakes Fishery Commission, an international body.

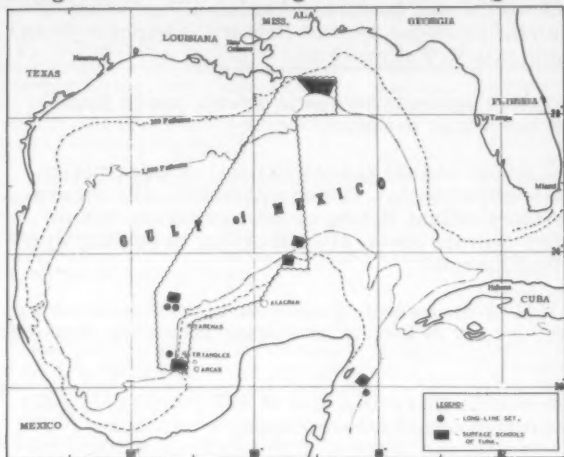


### Gulf Exploratory Fishery Program

SURFACE-TUNA EXPLORATIONS BY M/V "OREGON" (Cruise 45): Exploration for surface tuna in the Gulf of Mexico was the purpose of the two-month cruise (ended July 29) by the Service's exploratory fishing vessel Oregon.

During June, 117 schools of predominately little tuna (E. alletteratus) and white skipjack (K. pelamis) were observed in the northern Gulf. Approximately 75 of these were worked with live bait and jack poles; 16 schools responded to the bait

and worked under the fishing racks, but at no time would the fish take the squids alongside the vessel. Eight fish were caught on squids trolled 15 feet to 20 feet be-



M/V Oregon Cruise 45 (for two months ending July 29) in eastern Gulf of Maine

hind the vessel. The anchovies used for live bait were too small to be used for baiting hooks. The schools were found only in 85°-87° F. green water and exploration into adjacent blue water revealed no surface schools. Five schools of white skipjack were observed on the northern edge of the Campeche Banks, but bad weather made it impossible to work them. During July, breezing schools of skipjack and yellowfin tuna were observed in the southern Gulf on the shelf, west of Cay Arcas, but no bait was aboard at this time. Commercial long-line vessels reported surface schools of yellowfin and white skipjack northwest of Cay Arenas during this period.

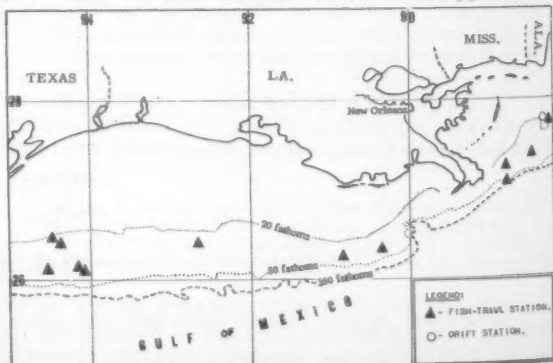
Three test long-line sets in the southwest Gulf in July yielded 14 tons of yellowfin tuna. The over-all catch rate for these sets was 14.6 yellowfin per 100 hooks.

Live bait was obtained at night with a light and a trap-lift net. In the northern Gulf, 14 bait stations were made. The catches were primarily small anchovies, and it was possible to land 200-300 scoops an hour. Twelve bait stations were made on Campeche Banks in the vicinity of Arcas, Arenas, Alacran, and the Triangles. Although numerous schools of *Sardinella* and *Jenkinsia* were found throughout the area, difficulty was experienced in catching sufficient quantities with the trap-lift net. The best catch for a single night was 80 scoops.

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**EXPLORATORY TRAWLING FOR RED SNAPPER IN NORTHERN GULF OF MEXICO (M/V Silver Bay Cruise 1):** Scattered small and medium red snapper were found in the Northern Gulf area from the Mississippi coast to the area off Freeport, Tex., by the Service's chartered exploratory fishing vessel *Silver Bay* during a two-week cruise which ended July 1 at Pascagoula, Miss. A combination of mechanical difficulties and severe sea conditions due to hurricane "Audrey" restricted trawling operations.

Twelve trawling stations were made from the Mississippi Coast to off Freeport, Tex., in depths of 17-56 fathoms. Scattered small and medium red snapper were found in each area trawled. The best drag, at 28°08' N. latitude, 94°35' W. longitude, yielded 260 red snapper weighing 350 pounds. This drag also caught 67 pounds of grouper and porgy. Other catches ranged under 100 pounds of red snapper per hour tow.



M/V Silver Bay Cruise 1 (June 12-July 1, 1957)

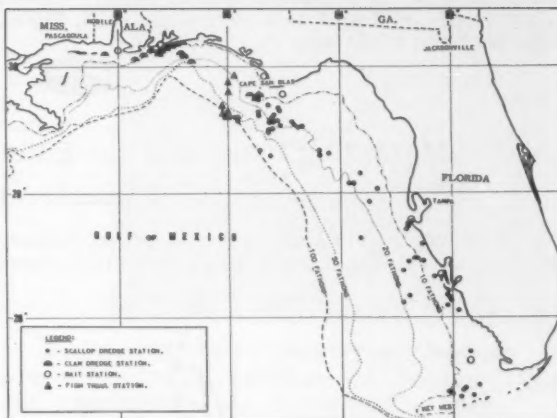
One tow, in 30 fathoms at 28°19' N. latitude, 90°18' W. longitude, caught 500 pounds of medium butterfish.

Very little difficulty was experienced in trawling over broken bottom using 52-foot and 60-foot fish trawls rigged with roller gear. On two occasions, the trawls hung up on coral lumps, but were hauled back with minor tears.

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**SHELLFISH AND SARDINELIKE FISH POTENTIAL EXPLORED IN EASTERN GULF OF MEXICO** (M/V Silver Bay Cruise 2): Shellfish potential and the scouting and sampling of sardinelike fish stocks were the objectives of the 17-day cruise of the Service's chartered exploratory fishing vessel Silver Bay. A total of 98 fishing stations were made on the Continental Shelf along the Florida west coast during this cruise which ended on July 29.

Using an 8' scallop dredge, 66 drags were made from Pensacola to Key West in depths of 3 to 105 fathoms. Gulf scallops (Pecten gibbus) were taken in most of the hauls inside of 50 fathoms. The best catches were made in an area south of Cape San Blas (latitude 29°05', longitude 85°16'). Up to six bushels of P. gibbus were taken in 30-minute tows in 19-20 fathoms. Yield was approximately 2 quarts of meats per bushel.



M/V Silver Bay Cruise 2 (July 12-29, 1957)

A total of 19 offshore drags with a 14-tooth quahog dredge were inconclusive, due to the dredges being consistently torn up by the hard sand and rock bottom. The dredges are to be modified to enable dredging on hard sand bottom.

Numerous surface schools of thread-herring (Opisthonema oglinum) were observed inside the 10-fathom curve from Port St. Joe southward. Greatest numbers (200-300 schools sighted per day) were seen in the offings between Tampa Bay and Charlotte Harbor. Attempts to sample these schools at night with a trap-lift net were generally unsuccessful. Subsurface fish schools sampled with trawls in the Cape San Blas area contained round herring, Etrumeus (in 20 fathoms), and an unidentified shad, Pomolobus (in 90-110 fathoms).



## Maine Sardines

**CANNED STOCKS, JULY 1, 1957:** Distributors' stocks of Maine canned sardines totaled 212,000 cases on July 1, 1957--58,000 cases, or 38 percent, more than the stocks on hand July 1, 1956. Stocks held by distributors on June 1, 1957, amounted to 230,000 actual cases, according to estimates made by the U. S. Bureau of the Census--18,000 cases less than stocks held on July 1, 1957.

Canners' stocks on July 1, 1957, totaled 895,000 cases (100 3 $\frac{1}{4}$ -oz. cans)--a substantial increase (580,000 cases) over the year-ago stocks and twice as much as on June 1, 1957.

The new Maine sardine packing season opened on April 15, and there have been significant amounts packed through June. The season ends December 1, 1957.

Table 1 - Canned Maine Sardines--Wholesale Distributors' and Cannery's Stocks, July 1, 1957 with Comparisons											
Type	Unit	1956/57					1955/56				
		7/1/57	6/1/57	4/1/57	1/1/57	11/1/56	7/1/56	6/1/56	4/1/56	1/1/56	11/1/55
Distributors	1,000 actual cases	212	230	295	344	388	154	160	268	326	354
Cannery's	1,000 std. cases 1/	895	416	465	879	1,016	315	64	152	475	625

1/ 100 3 1/4-oz. cans equal one standard case.

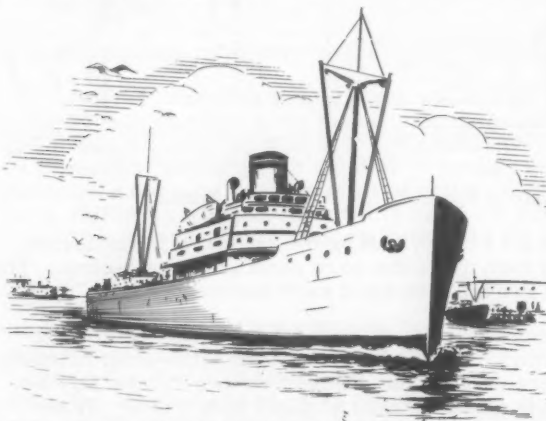
The pack April 15 to July 1, 1957, was 700,000 cases (100 3 1/4-oz. cans) and the carryover at the beginning of this season was 426,000 cases. This meant the available supply on July 1 this year was 1,126,000 cases as compared with 1,945,000 cases on the same date in 1956.



### Marketing Prospects for Edible Fishery Products, Third Quarter 1957

Per capita civilian consumption of fishery products during the next several months is expected to be close to the year-earlier rate. Judging from the

wholesale level in primary markets, retail prices have averaged somewhat higher thus far this year than last and are expected to continue higher this summer.



Commercial landings of edible fish and shellfish through mid-1957 were a little lower than a year earlier. Decreases were indicated for tuna and several other important species of fish and shellfish.

Freezings of edible fishery products in the continental United States through midyear were 2 percent less than a year earlier. May was the only month in which freezings were higher this year than

last. July 1 cold-storage holdings of edible fishery products were about as large as on the same date last year. Stocks of these frozen commodities will trend upward during the remainder of 1957 as supplies are built up for distribution during the seasonally low production period next winter.

Through early spring, imports of major fishery products were a little lower than in the same part of 1956. The percentage declines for major canned products and for frozen fillets and blocks were about the same. For fresh and frozen products other than fillets and blocks the total was about as large as a year earlier.

Canned fish exports, the major group of domestic edible fishery products sold abroad, were much lower through early spring this year than last. The reduction in tonnage was mainly in canned California sardines, the pack of which was very poor last year.

This analysis appeared in a report prepared by the Agricultural Marketing Service, U. S. Department of Agriculture, in cooperation with the U. S. Fish and Wildlife Service, and published in the former agency's July 29, 1957, release of The National Food Situation (NFS-81).





## North Atlantic Fisheries Exploration and Gear Research

**BOATLOAD OF BRINE-FROZEN GROUND FISH LANDED BY M/V "DELAWARE" FOR STORAGE AND HANDLING TESTS (Cruise 57-6):** A total of 72,500 pounds of groundfish was caught and either brine-frozen or iced aboard the Service's exploratory fishing vessel Delaware during this cruise which was completed on July 29, 1957. The 12-day otter-trawl cruise utilized a standard #41 net (headrope 100 feet, footrope 79 feet,  $4\frac{1}{2}$ " manila mesh) with a  $4\frac{1}{2}$ " synthetic cod end. All fishing was conducted on Georges Bank north of Corsair Canyon. The best catch during the trip was 4,000 pounds of haddock taken in 55 minutes.

After-use data on the synthetic cod-end was collected throughout the trip. Measurements on the amount of stretch and subsequent regain were made on various portions of the cod end during fishing operations.

All cod were examined for a copepod parasite whose frequency of occurrence is presently under study by the Service's biological staff at Woods Hole.

The 70,500 pounds of fish brine-frozen and stored in the refrigerated hold of the Delaware consisted of haddock (Melanogrammus aeglefinus): round, 23,000 pounds; dressed, 13,000 pounds; scrod: round, 33,000 pounds; pollock (Pollachius virens): round, 1,500 pounds. Approximately 2,000 pounds of haddock was iced for comparative quality tests with the frozen fish.

Frozen haddock and scrod will be distributed to industry for storage and handling tests. Distribution is being made in cooperation with the New England Groundfish Industry Committee.

The Delaware will resume exploratory fishing operations during cruise 57-7 scheduled to depart from East Boston on August 7. Scallop explorations and gear tests are planned primarily in the northeast peak of Georges Bank. This marks the continuation of scallop explorations in the areas not being commercially fished in an effort to locate areas of commercial potential. During the two-week cruise samples of scallops are scheduled to be frozen at sea using several methods of initial freezing. The samples will then be subjected to technological quality tests at the Service's East Boston Laboratory.



The Service's research vessel M/V Delaware.



## North Atlantic Fisheries Investigations

**STUDIES ON NONTIDAL DRIFT OF HADDOCK EGGS AND LARVAE CONTINUED (M/V Albatross Cruise 95):** The fifth in a series of cruises for the purpose of surveying the nontidal drift of Georges Bank and its relation to the drift of haddock eggs and larvae was made by the Service's research vessel Albatross III between June 5-12, 1957. The study for the 1957 spawning season was ended with this cruise.

Approximately 1,500 miles of continuous plankton tows were made at the surface and 10 meters with Hardy Plankton Recorders; 151 Bathythermograph lowerings,

75 salinity samples, and 14 meter-net surface tows were made; 552 drift bottles were released. Two transponding buoys were picked up. Buoys "November" and "India" were not found.

Haddock larvae were found on the southeast part of Georges Bank. Buoy drift indicated a very strong westerly drift along the southern edge of Georges Bank.

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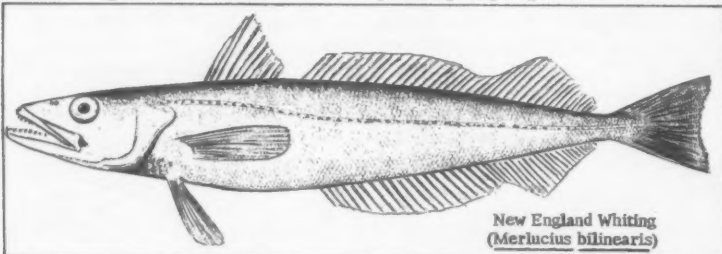
**WHITING BEHAVIOR IN TRAWLS STUDIED WITH UNDERWATER TELEVISION (M/V Albatross III Cruise 97):** In order to study the behavior of whiting in trawls with underwater television, the Service's research vessel Albatross III sailed from Boston on July 10 and returned on July 13. The vessel operated on the western and eastern sides of Great South Channel.

Fish capture was observed with the camera positioned inside the belly of the trawl and between cover and cod end of a typical covered cod end rig used for selectivity experiments.

Too few fish were found in water of the proper depth and clarity to provide good film records of behavior. Good progress was made in working out the details of camera positioning, however.

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**WHITING TAGGING (M/V Albatross III Cruise 98):** The tagging and collection of whiting (silver hake) was the principal purpose of this cruise of the Service's re-



New England Whiting  
(*Merluccius bilinearis*)

search vessel Albatross III. The vessel, which sailed from Provincetown, Mass., on July 14 and returned to Woods Hole, Mass., on July 19, operated four miles northwest of the Cultivator whistle buoy.

A total of 21 tows were completed. A

total of 1,094 whiting were tagged, 706 otoliths were taken, and 3,260 length measurements by sex were recorded.

Cruise 100 on August 14 was a one-day demonstration trip for members of the New England fishing industry.

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**VERTICAL DISTRIBUTION OF OCEAN PERCH AND HADDOCK FRY SAMPLED IN GULF OF MAINE (M/V Albatross III Cruise 99):** Sampling the vertical distribution of ocean perch and haddock fry in the western part of the Gulf of Maine was the objective of this cruise (July 25-August 2) by the Service's research vessel Albatross III.

A series of 84 tows was made with the Isaacs-Kidd midwater trawl at 8 stations in the western Gulf of Maine. The trawl was rigged as an opening-closing net and was towed at a series of depths, top to bottom, at each station. The trawl operated well most of the time. Minor gear failures suggested changes needed to improve the trawl depressor for operations in these waters.

Larval fishes were collected at all stations in the following order of abundance: ocean perch or redfish, hake or rockling, haddock, flatfish, whiting, and mackerel. Collections of more than 1,000 ocean perch were made at several stations. Ocean perch ranged from 12-40 mm. in length. Haddock were widely distributed and occurred in small numbers, primarily in tows where the jellyfish *Cyanea* was present. The haddock appeared to fall into two size ranges, 4-8 cm. and 9-14 cm. These are the largest collection of small ocean perch and haddock ever taken in midwater in the western Atlantic.



Service's research vessel Albatross III.

The greatest numbers of fish were taken at 20 meters depth during both day and night. Few fish were caught below 40 meters. A highlight of the collections was the capture of a large ocean perch (29 cm.) during the night at a depth of 40 meters over waters of 110 fathoms. There are few records of adult ocean perch taken at mid-depths, and little is known of the diurnal, vertical migration.



### North Pacific Exploratory Fishery Program

**TRIALS OF NEW ELECTRICAL DEPTH-TELEMETER FOR MIDWATER TRAWLS SUCCESSFUL** (M/V John N. Cobb Cruise 31): Successful trials with a new electrical depth-telemeter for midwater trawls highlighted this Cruise of the Service's exploratory fishing vessel John N. Cobb. The vessel returned to Seattle



Fig. 1 - New electrical telemeter located ahead of trawl door. Telemeter housing contains pressure gage which converts water pressure to electrical resistance. Trawl door is new type constructed of aluminum and designed for use in midwater or bottom trawling.

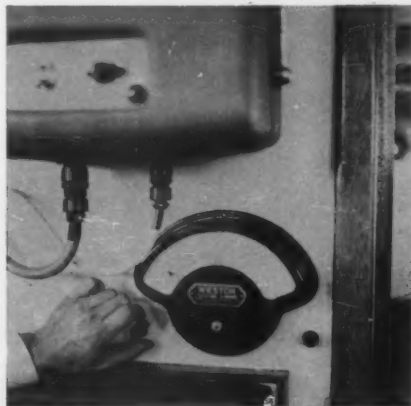


Fig. 2 - View of meter measuring electrical resistance gradient for conversion to depth readings. Meter is mounted below regular depth-sounder in pilot house of John N. Cobb.

on June 21 after completing almost two months of midwater trawling experiments off the coasts of Washington and British Columbia.

During the last three weeks of the cruise, the acoustic depth-telemeter was replaced by the new electrical device, which operated accurately after several minor

failures were remedied. The electrical telemeter, about the size of a baseball, was attached just ahead of one of the trawl doors. Accurate depth of the gear was determined continuously by a gage converting water pressure to electrical resistance. The resistance gradient was transmitted to the vessel through an electrical-conductor-core trawl cable. A meter mounted in the wheelhouse next to the echo-sounders and "Sea Scanar" converted the electrical-resistance to depth readings. It was thus possible to keep the net at any desired depth by varying the speed of the vessel and adjusting the length of cable.

In general, during the entire cruise few schools of fish were located in mid-water and catches were small. A total of 37 tows was made with the midwater trawl on depth-sounder indications. Hake, herring, dogfish, smelt, rockfish, turbot, and several other species were caught in varying amounts. The largest catch of herring was 500 pounds. On many tows large numbers of euphausiids were caught in the nylon twine of the 64-foot square trawl.

One large school of hake was located near the bottom in 48 fathoms. A 22-minute tow, during which the trawl was near or touching the bottom part of the time, caught an estimated 10,000 to 20,000 pounds of hake. The trawl burst open at the surface, and all the hake were lost except 1,000 pounds landed on the first split.

A new pair of aluminum trawl doors, designed to be fished either in midwater or on bottom, was also used successfully for the first time on the John N. Cobb. The doors were patterned after those recently developed at the Nanaimo Biological Station of the Fisheries Research Board of Canada.

Note: See Commercial Fisheries Review, June (1957) p. 30.

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#### HERRING EXPLORATIONS IN OFFSHORE WATERS OF ALASKA UNDER WAY:

Herring explorations in offshore Alaskan waters are being conducted by the Service's exploratory fishing vessel John N. Cobb. The vessel left Seattle on July 15 (cruise 33). Explorations will extend for a seven-week period and the vessel was expected back in Seattle on August 30.



The Service's exploratory fishing vessel John N. Cobb.

Although a commercial herring fishery has existed in Alaska for 50 years, the catch has been taken entirely in bays and inlets with occasional fishing a few miles off the coast in certain areas. Fishing vessels crossing the Gulf of Alaska at times have reported seeing schools of herring in the open ocean, but more information is needed on the existence, abundance, and availability of offshore herring stocks. It is important to know to what extent the inshore herring migrate offshore, and also to determine if there are stocks of offshore herring and what contribution they may make to the inshore fisheries.

The John N. Cobb was expected to explore the waters off Baranof Island in southeastern Alaska and work up to Prince William Sound. A series of zigzag

courses were to be run out to a minimum distance of 50 miles offshore, with at least one tract line extending out to the middle of the Gulf of Alaska. A "Sea Scanar" was to be used to assist in locating herring schools. Midwater trawls and gill nets were to be the principal types of gear employed for catching herring. Detailed records were to be kept of the location, numbers, size, composition, movements, and availability of all herring schools located offshore.

The offshore explorations were to be closely coordinated with the inshore herring research program administered by the Service's Marine Fisheries Investigations in Juneau.



### Oregon

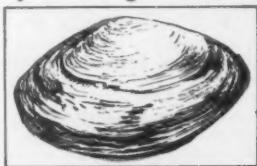
**TAGGED ALBACORE CAUGHT BY JAPANESE:** A 20-pound albacore tuna that had been "branded" with a tubular plastic spaghetti type tag on August 11, 1956, about 300 miles off the Oregon coast by Fish Commission of Oregon biologists was reported caught by a Japanese vessel. On June 3, 1957, the tagged albacore was caught by a Japanese vessel off the coast of Japan. During the ten months the fish was at liberty, it had doubled its weight, the Commission announced in July.

The Commission research director said the albacore tag recovery further substantiates the theory that albacore caught sporadically in Oregon waters during late summer are destined for Asiatic waters. California biologists have reported similar recoveries of albacore tagged off southern California.

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**SOFT-SHELL CLAMS TRANSPLANTED:** Approximately 9,000 soft-shell clams have been planted in the tide flats of the Siuslaw River by the Fish Commission of Oregon. The clams began their sedentary lives 150 miles up the Oregon coast in Nehalem Bay, a July news release from the Commission points out.

The clam transplant is being made by the Commission in an attempt to restore the former high production of soft-shell clams in the Siuslaw area. In all, about 2,000 pounds (15,000 clams) will be "planted." Close to 1,300 pounds were transferred in late June.



Soft-shell Clam

At the Siuslaw planting site, the seeding area was staked off and clams were set out in rows, not unlike potato planting. Holes were made with a makeshift planting tool. Each clam then had to be hand-planted and covered with tide-flat muck. The clam transplanting is being accomplished by a crew of four biologists. Seed stock is purchased at the going market price from a commercial digger at Nehalem Bay.

Such transplanting has been successful on the East Coast. Encouragement of success is gained from the fact that all soft-shell clams on the West Coast are believed to be the result of early-day transplants from the Atlantic seaboard.

"We do know that the abundance of clams in Siuslaw Bay has been at a low level since 1953," says a State biologist. "If overdigging was a major factor in the decline, introduction of more spawning stock may be the answer."

But, there is a good possibility that the environment for clams has changed in the Siuslaw River. If this is the case, the biologist is pessimistic about benefits from seed stocking the area until original conditions are restored.



The Siuslaw River east of U. S. 101 has been closed to all clam digging and will remain so until at least October 1, 1959, to protect the new seed stock. Biologists will make periodic checks of the area during the next two years to see how the planted clams are progressing.



## Pacific Oceanic Fishery Investigations

**ANNUAL REPORT FOR FISCAL YEAR 1957:** During the year (July 1, 1956-June 30, 1957) efforts of the Service's Pacific Oceanic Fishery Investigations (POFI) were centered around three large programs. The first was a descriptive survey designed to ascertain the tuna resources, especially skipjack, of the southeastern Pacific. The results of the first cruises, centering around the Marquesas Islands, will be used to plan the final year's field work during fiscal year 1958. The second major area of operations centered around the skipjack population in the Hawaiian waters. Here, the Hawaiian fishery is being used as a laboratory situation for the study of oceanic skipjack in general. Most of the effort during the year revolved around understanding the nature of the population of skipjack and completion of field work designed to show whether fluctuations in the fishery can be rationalized on the basis of changes in the environment. The third major subdivision, albacore research, was focused on the newly discovered mid-ocean resource lying between Hawaii and Alaska, and the development of an elaborate survey program off the Pacific coast during the summer of 1957. In addition, a number of important studies were conducted independently of the major programs. These projects, aligned by discipline, such as tuna larva studies, are designed to produce results applicable to tuna in general and so are treated separately.

Finally, an approach new to POFI, the study of tuna behavior, was started in a small way by devising a system that permits direct observation of tuna behavior during chumming. This opens the way to development of an intensive research program in this field, a field that holds great promise of contributing directly to raising the efficiency of tuna fishing.

**Equatorial Tuna Program:** The year marked a drastic curtailment of the equatorial program in the vicinity of the Line Islands. Emphasis was shifted to begin evaluation of the tuna resources of northeastern French Oceania, with concurrent broad-scale oceanographic coverage of that area.

Multiple-vessel surveys were conducted during August-September 1956, and January-March 1957; the southern hemisphere winter and summer, respectively. Times of the cruises were selected to afford the greatest contrast of environmental conditions, and of tuna availability.

Preliminary results of these cruises reveal the following:

1. In the immediate vicinity of the Marquesas Islands, skipjack tuna were very abundant during the summer. Approximately three times more schools were seen during the summer than winter.

2. During the times of the surveys, surface schools of skipjack greatly outnumbered surface schools of yellowfin tuna in the Marquesas area.

3. There are supplies of live bait (Marquesas sardines) in the bays of the Marquesas adequate for a fishery of limited size.

4. Catches of deep-swimming tuna in the Marquesas area also indicated that their availa-

bility was about 3 times greater during the summer.

5. Surprisingly, one index of the productivity of the area, the volumes of zooplankton from the surface to 200 meters, indicates a picture contrary to general expectations: the volumes obtained in the general area of the Marquesas were about twice as large during the winter as summer. To the east of the Marquesas, longitude 130° W., volumes were about equal, winter and summer. South of the area (south of 18° S.) is what appears to be an extremely unproductive area with volumes from the 0- to 200-meter tows less than 10 cubic centimeters per 1,000 cubic meters, both summer and winter.

6. Another index of productivity, the concentration of inorganic phosphate at the surface, confirms the picture derived from the study of zooplankton volumes. In the whole broad area covered these values were appreciably lower during the southern hemisphere summer than winter. It is probably significant that the variability of inorganic phosphate concentration was much greater during the winter, especially around the Marquesas-Tuamotus area. This may be indicative of the role these land masses play in bringing enriched water into the euphotic zone.

7. Water flow at the surface through the Marquesas and Tuamotus was a large clockwise eddy.

Variability and significance of this feature is not yet fully known.

The August-September cruises also represented POFI's participation in Operation EQUAPAC, which was a quasi-synoptic oceanographic survey of the entire central and western equatorial Pacific. EQUAPAC was conducted by 11 oceanographic vessels of Japan, the United States, and France, including 2 POFI vessels.

POFI's contribution to the International Geophysical Year (IGY) began on June 21-23, 1957 with the preliminary occupation of an oceanographic station offshore from Oahu. The plan is to occupy this station once every month during the 18-month period of the IGY. This station involves the determination of density conditions between the surface and 300 meters at the time of high and low tides on the day of each station. Biological observations include the rate of carbon fixation as determined with the  $C^{14}$  isotope, and the standing crop of zooplankton.

**Mid-Ocean Skipjack Program: THE FISHERY:** The commercial fishery had a slightly better than average year in terms of total pounds landed. Between January 1 and December 31, 1956, 11,132,222 pounds of skipjack (aku) were landed in the Territory of Hawaii. Since 1948, there have been only 3 years (1951, 1953, 1954) in which more skipjack were caught. Estimated landings for January 1 to June 30, 1957, are considerably lower than last year, or even 1952, the poorest of the past 9 years. Further, "season" skipjack (18- to 22-pound fish) have not appeared in quantity in Hawaiian waters so far in 1957.

Existing catch records show us only the weight of skipjack landed, the area in which the catch was made, and the value of the catch. As a means of obtaining more information concerning the skipjack fishery, log books were placed aboard 5 sampans. In these log books the fishermen record all schools sighted, whether fished or not, and estimates of the fish and school size. Two bits of information may be gained from these records: (1) the proportion of schools fished, and (2) an estimate of the number of schools of small skipjack. The latter is especially important because there is considerable selection by the fishermen as to the size of skipjack caught. These books have been on the sampans six months and a preliminary examination shows we are getting most of the desired information.

**ENVIRONMENTAL STUDIES:** The collection of environmental data in the area of the fishery adjacent to Oahu has continued. During F.Y. 1957 two comprehensive surveys and a number of monitoring surveys by POFI and the Territory of Hawaii Division of Fish and Game were completed. We now have observations covering a 20-month period and can discern differences in the environment between two skipjack seasons. During the 1956 skipjack season (May-September) mean temperatures off windward Oahu were 10-20° F. colder than off leeward Oahu. Salinities were 0.11 ‰/‰-0.28 ‰/‰ higher in the windward than in the leeward areas. During the off-season, temperature and salinity on the two sides of Oahu were very similar. The time at which the divergences in temperature and salinity occurred was also the time at which the 1956 skipjack landings increased sharply. During the early 1957 season, there have been no such divergences in temperature and sal-

inity, and the skipjack landings have been low, with small landings of "season aku" (18- to 22-pound fish). There is thus a strong indication that the appearance of "season" skipjack in 1956 was causally associated with a change in the environment.

**COOPERATIVE TEMPERATURE AND SALINITY SAMPLING PROGRAM:** During February and March 1957, the collection of sea surface water temperatures and salinity samples was begun at the following locations by the agencies indicated: (1) Ocean Weather Station Victor at 34° N. latitude, 164° E. longitude (U. S. Weather Bureau); (2) Midway Island (U. S. Navy); (3) French Frigate Shoals (U. S. Coast Guard); (4) Upolu Point, Hawaii (U. S. Coast Guard); (5) Johnston Island (U. S. Air Force); and (6) Wake Island (U. S. Weather Bureau). Observations and collections made at these points should enable us to anticipate changes in the general circulatory pattern of the waters which bathe the Hawaiian Islands, and the results should eventually permit long-range prediction of mid-ocean skipjack.

In addition to the new sampling sites listed, observations were continued near Koko Head, Oahu. Temperatures at this site were 0.50-2.00° F. colder in 1957 than in 1956 during February to June. In June 1957, water temperatures were higher than in June 1956. Salinities between February and June were from 0.0 ‰/‰-0.5 ‰/‰ higher in 1957 than in 1956. This is a further indication, in addition to data from the monitoring surveys, that there is a distinct difference in environmental conditions between 1956 and 1957.

**TAGGING:** During June of 1956 new all-plastic dart tags were placed on a small number of skipjack. In October one of these tags was recovered. Encouraged by this relative success, the tag was modified and in April-May 1957, 1,978 skipjack were tagged with the D-2 dart tag, and released in Hawaiian waters. As of June 30, 1957, we have recovered 9 of these tags. This is a slightly better rate of recovery than that observed in previous years using the spaghetti-type tag.

Previous tagging had not shown movement of the skipjack from one island to another. Skipjack tagged this year moved from Oahu to Kauai, and Molokai to Hawaii. Each year of tagging has added to our knowledge of tag construction and growth and migrations of skipjack, but we encounter puzzling situations which we suspect may be related to these same migrations. Why do we get several recoveries of skipjack released in one school and none from skipjack released in many other schools?

During the period of skipjack tagging, the stomachs of large tuna and marlin were examined at one Honolulu auction market. This was done to find out whether or not there was a loss of tagged fish due to predation. Seven skipjack were found in 176 stomachs and none were tagged fish. Of the seven, 3 were about one pound and 4 were 3-5 pounds in weight. These results show no evidence of predation on tagged skipjack.

**Special Studies: LARVAL TUNA:** Drawings of larval *Auxis* and *Euthynnus* and a rough draft of the species descriptions were completed. All specimens were sorted by area of capture, and work was started on a world-wide distributional study. In general terms, the larvae of *Euthynnus lineatus* are quite distinctive from those of *E. yaito* and *E. alletteratus*, but the latter two are not easily sep-

arable from each other. So far as known, there are at least two species of *Auxis*, only one of which occurs in the Atlantic, but both species occur together in various parts of the Pacific. Two types of *Auxis* larvae were found in all oceans but these become indistinguishable at a certain size. In addition, larval *Scomber japonicus* were identified, reducing the number of unknowns by one.

An effort was made to develop more efficient means of sampling larvae in the field.

**TUNA FORAGE ORGANISMS:** The 53 mid-water trawl collections obtained on the EASTROPIC expedition and about half the collections made on EQUAPAC were analyzed in the laboratory. An initial examination of the EASTROPIC data showed a peaking in volume of forage organisms in the region of convergence and the southern boundary of the Countercurrent, between 3° N. and 6° N. latitude and about 300 miles north of the peak in zooplankton abundance. Longitudinally the largest catches occurred in the central region between 125° W. and 145° W. These results, after further study and analysis, should increase our understanding of both the time and space aspects of trophic succession from basic productivity to the tunas.

**FOOD OF SKIPJACK:** This study has produced several results of interest.

1. By volume, 703 skipjack were found to have eaten 73 percent fish, 22 percent molluscs, and 4 percent crustaceans. Molluscs, particularly the squid, were much less important in the food of skipjack than in the food of yellowfin and big-eyed. In all 3 species of tuna, fish formed a high percentage by volume--60 to 75 percent.

2. In respect to composition of the food, the main fish families represented in the food of skipjack were Thunnidae, Carangidae, Molidae, and Gempylidae; of yellowfin: Bramidae, Gempylidae, Thunnidae, and Suididae; and of big-eyed: Gempylidae, Bramidae, and Suididae, in order of importance. Larval or juvenile skipjack composed 8 percent of the food of skipjack. Juvenile tunas were also prominent in the food of yellowfin but scarce in big-eyed.

3. The average volume per stomach increased from 15.5 cc. for skipjack of less than 60 cm. to 27.4 cc. for skipjack over 60 cm. With an increase in size, the feeding shifted from crab larvae to the more pelagic amphipods and euphausiids, and from chaetodonts, acanthurids, and synodonts to Decap-terus, molluscs, and gempylids, the latter being the more oceanic in distribution.

4. There was no definite trend in respect to distance from land when captured from land and average volume per stomach, but there was a shift in composition with littoral forms being replaced by more pelagic forms in an offshore direction.

5. Differences associated with method of fishing were apparently most closely related to the distance from land of the place of capture and also to the depth of fishing. For example, the frequency of occurrence of fish dropped from 89 percent for surface-caught skipjack to 33 percent for subsurface- (long-line) caught skipjack. Molluscs (mostly squid) increased from 9 percent for the surface to

59 percent for subsurface-caught fish, and Crustacea were less plentiful at the subsurface level.

6. Judging by the volume of food remains, the highest rate of feeding in skipjack took place just before noon and again in the late afternoon. The lowest rate was during early morning and early afternoon. The highest percentage of squid was found in the early morning and late afternoon hours. These data upon further analysis may contribute information on feeding depth and vertical migration.

**VERTICAL AND HORIZONTAL DISTRIBUTION OF ZOOPLANKTON:** Laboratory measurements on approximately 450 zooplankton samples collected on the EASTROPIC expedition were completed. Although the results have not as yet been thoroughly studied the following points were evident:

1. The day-night variation was only of importance in hauls that sampled near the surface, and it was evident that the great bulk of the plankton occurred in the upper 60 meters.

2. The effects of enrichment from such features as the equatorial upwelling and the shallow thermocline along the northern boundary of the Countercurrent were more pronounced in shallow hauls than in deep hauls, and in night hauls than in day hauls.

3. Within the divergent and convergent zones (1½° S. to 5° N. latitude) the abundance of zooplankton decreased from east to west varying directly with the drop in winds and the degree of upwelling, but inversely with thermocline depth.

4. Within the South Equatorial Current between 1½° S. and 8° S., there was an increase in abundance from east to west, thus discounting the importance of the Peru Current as a factor contributing to the enrichment of these latitudes in the central Pacific.

**TILAPIA CULTURE:** In the spring of 1956, the Hawaiian Tuna Packers, Ltd., and the Pacific Oceanic Fishery Investigations joined forces in an informal agreement for the purpose of seining supplies of small bait-size tilapia and testing these fish at sea to determine their qualities as skipjack bait. Seven full-day and 2 half-day seining expeditions yielded 630 pounds of small tilapia. These were obtained principally from fresh-water ponds and therefore had to be acclimatized to sea water before the sea tests.

The effective use of tilapia as skipjack bait was examined on 14 vessel days at sea in waters off Oahu. It was the prime objective of these tests to compare the ability of nehu (the standard bait) and tilapia in attracting and holding schools of skipjack at the stern of the vessel. A summary of the results shows that 21 (56 percent) of the 37 schools first chummed with nehu surfaced and responded to the bait, also that 10 (56 percent) of the 18 schools first chummed with tilapia gave a favorable response to the bait.

Skipjack were caught from 9 schools at the rate of 3.5 fish per minute and 12.2 fish per bucket of tilapia used. This is not as good as the catch rate of 4.8 skipjack per minute and 15.3 per bucket of bait obtained with nehu from 23 schools, but there is every reason to believe that with experience

chummers will learn to use the new bait more effectively.

It is our conclusion that tilapia is an adequate bait for catching skipjack. In some respects it may be slightly inferior to nehu, but it has several compensating qualities. It is an exceedingly hardy fish and can survive in bait tanks for much longer periods than the nehu. The larger tilapia tend to sound when thrown out as chum, but this trait is not prevalent in fish  $1\frac{1}{2}$ " to 2" in length, which is the optimum size for skipjack bait. Our studies indicate that if economically-feasible rearing methods can be developed, the tilapia can alleviate the great need in the Hawaiian skipjack fishery for additional bait supplies.

Our experiences during the past summer have shown that the culture of tilapia in "natural" ponds or reservoirs is not a very efficient way of rearing the fish. Such ponds do not provide enough natural food for the fish, extra feeding is necessary, cannibalism is a major problem, and it is not easy to remove the fish. Sorting the bait-size fish from the large fish is also a problem.

In October 1956, we constructed 3 redwood tanks on the laboratory grounds to determine if a hatchery-type operation would be biologically and economically feasible in rearing tilapia as bait. From December 20, 1956, when production of young fish started, until June 30, 1957, 126 adult females produced about 77,000 fry. We have experienced a fairly high mortality among the young fish due to cannibalism and probably to low oxygen concentrations; both of these factors will be reduced in importance by the improved and enlarged fry-rearing facilities which are presently being constructed.

The practicality of rearing tilapia as bait in the presently available fish ponds and reservoirs is receiving further study this summer. In February and March 1957, 8,749 adult tilapia in two ponds, one a natural brackish-water pond and the other an artificial, fresh-water reservoir, were marked by fin-clipping. Seining will be carried out at intervals during the summer to determine the production of young and to obtain estimates of the total adult population in each pond.

In December 1956, POFI instigated the formation of a "Bait Fish Research Coordinating Committee." Membership on the Committee includes representatives from POFI, the fishing industry, the University of Hawaii, and the Territorial Division of Fish and Game. The purpose, of course, is to coordinate the activities of the various groups here in the Territory that are working on different phases of the general bait-fish problem and to keep members informed on what the other agencies are doing.

**Miscellaneous Research:** "SEA SCANAR:" In the first quarter of the fiscal year the "Sea Scanar" was put through a series of experiments and sea trials. Under ideal sea conditions good returns

were received from manufactured triplane targets at a maximum distance of 2,180 ft., a single dead skipjack at 1,070 ft., and a single dead herring at 470 ft. Records of aggregations of skipjack, dolphin (*Coryphaena*), porpoise, and blackfish were obtained. Returns from an albacore school were recorded in the second quarter. Failure of the instrument precluded further use for the rest of the year.

**HAWAIIAN LONG-LINE FISHERY:** Big-eyed and yellowfin data from the Hawaiian long-line fishery for the period 1948-1956 were analyzed and a draft of the manuscript completed. The results show that the increase in big-eyed landings and the decline in yellowfin landings during this period were associated with the differential availability of these two species in the windward and lee areas and also with shift in fishing area by the larger vessels from the lee of the northern islands to the windward waters of the southern islands.

Big-eyed were more available in the windward areas than in the lee, while the reverse was true with the yellowfin which were more available in the lee areas.

The larger vessels showed an annual increase of effort expended in the windward areas of the southern islands from a low of 22 percent of the total trips made during 1948-1949 to a high of 88 percent during 1953-54.

**INTRODUCTION OF MARQUESAN SARDINE:** Approximately 175 pounds of Marquesan sardine (*Harengula vittata*) were released near shore on Oahu. These were in two lots; the first containing 2,500 individuals was released in Hanauma Bay, Oahu, on September 26, 1956, and the second of about 12,000 individuals was released in Pokai Bay, Oahu, on March 22, 1957. Eight individuals have been recovered by tuna bait fishermen, the last on June 4, 1957. To date there is no evidence the species has been established in Hawaiian waters.

**Contract Research (University of Hawaii):** **TUNA VISION:** A report on the histology of the retina of small and large skipjack has been received. The retina in both instances appear to differ little from a general vertebrate eye.

**GREEN TUNA:** This work is in its closing phases. There now appears to be a well-established relation between "greening" and the presence of fat peroxide. There is some evidence that a green pigment may actually exist in "green" tuna.

**ELECTROFISHING:** Some experiments looking towards controlling the field and pulsing with an amplidyne were completed. However, essentially the project has not advanced significantly during the past year. It is anticipated that direct University of Hawaii participation in this work will cease when a final report is submitted. The contract ended in August 1956.

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**NORTH PACIFIC ALBACORE INVESTIGATIONS FOR FISCAL YEAR 1957:** The third year (July 1, 1956-June 30, 1957) of albacore tuna investigations in the North Pacific under the Saltonstall-Kennedy Act has been completed. The keynote of these



investigations has been the coordination of efforts with those of other interested government agencies through the Albacore Steering Committee of the Pacific Marine Fisheries Commission. This committee has been particularly effective in facilitating integration of field work and in making most efficient use of the available vessels and personnel.

**Distribution:** Studies were primarily oriented toward (1) mapping the early summer distribution of albacore; (2) further defining the concentrations of albacore lying in a band between Hawaii and the Aleutians during the summer; and (3) surveying the fall distribution of albacore from approximately 145° W. eastward to the Pacific Coast. Primary emphasis during the year was given to gill-netting and surface trolling, both of which have been shown to effectively catch albacore.

During the summer the research vessel John R. Manning took albacore in a narrow zone between



The Service's research vessel John R. Manning.

175° W. and 145° W. East of 145° W. the John N. Cobb conducted surveys from there to the coast, capturing widely scattered albacore. As is well known by now, commercial fishermen following up these catches, and in part guided by the successful fishing of the John R. Manning off the coast during the summer of 1955, moved offshore and located

The results of the survey by the John R. Manning between Hawaii and Alaska are summarized in figure 1. The vessel took large numbers of albacore from the most western leg of her survey (175° W.) by gill net and trolling. The region of high abundance extended as far east as 160° W. longitude. From this point to 145° W. longitude, abundance progressively decreased. During the first part of the survey along 175° W., albacore were most abundant between 41° N. and 46° N., with centers of abundance around 43° N. and 45° N. The second portion of the survey, the eastward trolling and gill-net leg, yielded relatively abundant catches somewhat farther north.

The John R. Manning caught a total of 602 fish, representing approximately 4.5 tons of albacore. Of these, 451 were taken in gill nets, 104 on troll lines, and 47 in trammel nets. The fish ranged in weight from 7 pounds to 30 pounds. Particularly noteworthy is the large catch by gill net, despite the fact that the 12 shackles were not all of suitable mesh size for optimum catch. High catches such as these, made on small amounts of gear, suggest that there are commercial possibilities in this area. These possibilities are enhanced by the proximity of Aleutian bases for logistic support and the fact that the area is readily available to halibut fishermen who have experience with fishing conditions in this general area.

Despite the fact that trolling was conducted from dawn to dusk of each day, it produced fewer albacore than gill-netting. However, the catches in general verified the centers of abundance as revealed by the gill nets.

It is believed that the success during this summer cruise was at least in part the result of an exceedingly shallow thermocline in this region. During some days the layer of warm surface water in which the albacore live was so shallow that the ship's propeller brought up the deeper, colder

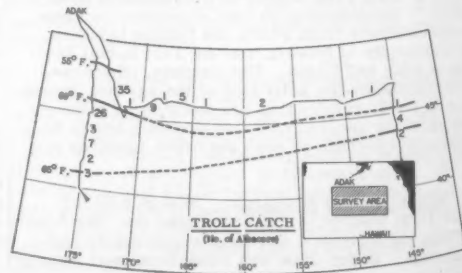


Fig. 1 - Summer albacore survey (Cruise 32, July 17-September 12, 1956) by John R. Manning, research vessel of the Service's Pacific Oceanic Fishery Investigations; a total of 602 fish were caught.

albacore in commercial quantities. Thus there developed the first sizable albacore landings off the Oregon coast in several years.

water. Under such environmental conditions we suspect that the albacore are restricted to a thin surface layer of water and are particularly vulnerable



to gill nets. Some of the evidence for this belief lies in the observation that following a storm, which deepened the thermocline, the gill-net catches dropped off. Later, during the fall surveys, when the thermocline was about 200 feet below the surface, the gill net did not catch appreciable numbers of albacore.

The fall surveys by the John R. Manning and Charles H. Gilbert were designed to describe the distribution of albacore between Hawaii and the United States west coast (fig. 2) at a time when the coastal fishery was diminishing. Trolling was conducted throughout both cruises. Whenever

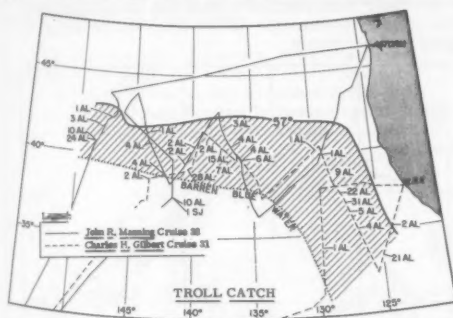


Fig. 2 - Fall albacore surveys by John R. Manning and Charles H. Gilbert.

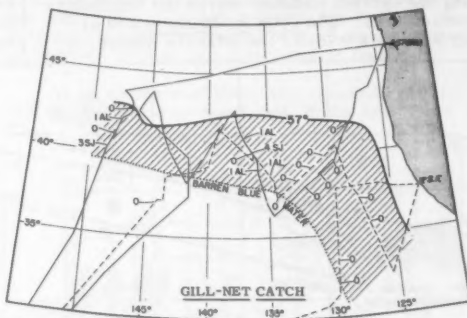
weather permitted, gill nets were set at night. If the weather was too bad for gill-netting, the vessels either jogged or reduced their speed at night to avoid large gaps in the trolling coverage.

Albacore were taken in significant numbers over a wide area extending from the western border of the survey to the west coast a few miles north of San Francisco. The results are particularly gratifying because the distribution of albacore can be rather logically associated with the distribution of environmental properties. All catches were made in an area with well-defined limits. To the north and east catches were confined by the 57° F. surface isotherm. The southern limit was the northern boundary of the barren, blue, central, northeastern Pacific water as indicated on the chart. This boundary could be readily determined from the bathythermograph sections and also from the clarity of the water.

In the barren central water the color was an intense blue, and the Secchi disc could be seen to a depth of 18 fathoms. In the more productive transition zone where albacore were caught the transparency as measured by the Secchi disc was reduced to 10 or 12 fathoms and the color became blue-green. In the coastal water, which did not contain albacore, the Secchi disc could be seen only to depths of 7 to 9 fathoms and the color was green.

The fall distribution of albacore, extending from the coast to well offshore in a fairly continuous band, suggests that a migration away from the coast is taking place and that it is a gradual exodus rather than a rapid, purposeful migration as may have occurred when the albacore were approaching the coast in the spring.

Analysis of data collected since the start of the program in 1954 has enabled the postulation of a general hypothesis concerning the migration of albacore in the North Pacific. In the spring, these fish perform a rapid and purposeful migration from mid-ocean to the coast of California. During the summer, the migration continues with the route gradually shifting to the north. At the same time the albacore now in the coastal waters also tend to move northward following optimum temperature conditions. Toward late summer the migration toward the coast ceases and there is a gap in the oceanic distribution from about 140° W. to 160° W. longitude at about 45° N. latitude. This gap coin-



cides in time with the formation of the well-developed thermocline in the central North Pacific and the associated high concentrations of surface albacore as shown in figure 1. In the eastern North

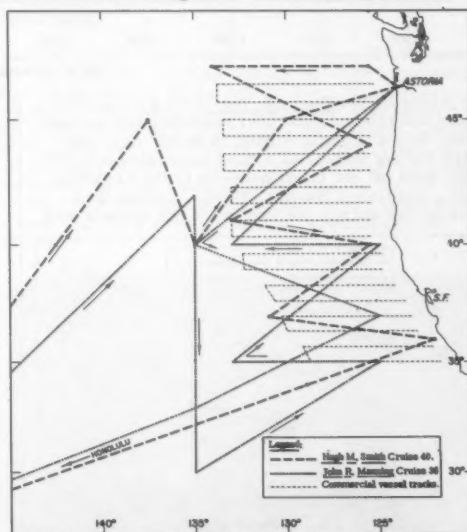


Fig. 3 - Northeastern Pacific albacore survey.

Pacific the albacore are scattered along the entire west coast of the United States. During the fall they undertake a gradual westerly movement away from the coast bridging the gap (fig. 2) and ultimately appearing in the Japanese winter fishery.

This hypothesis is partly confirmed from tagging results.

In the future field studies will be largely in the areas which have shown commercial promise. Surveys will be continued to ascertain the migration routes into these areas and the oceanographic and biological parameters which govern these movements. Within the areas emphasis will be on the microdistribution and ecology of the albacore.

The Northeastern Pacific Albacore Survey (NEPAS), a concentrated survey of the waters off the northern California, Oregon, and Washington during the current summer marks the beginning of such studies. The John R. Manning has already begun a survey of the offshore waters and

of Japan and one was recovered in California coastal waters. The recoveries give considerable support to the contention that there is only one albacore population in the North Pacific. In particular, note the two recoveries from fish tagged in 1955. Although they were released within a few miles of each other, one was recaptured by a Japanese live-bait vessel about a thousand miles off Japan on June 24, 1956, and another was recovered off Baja California on August 1, 1956. The two recoveries were made about 5 weeks apart; the distance between the points of recovery is about 4,350 miles. These returns may not seem to be strictly in accord with our hypothesis of migration but their interpretation depends on an unknown factor--their movements in the interval between tagging and recovery.

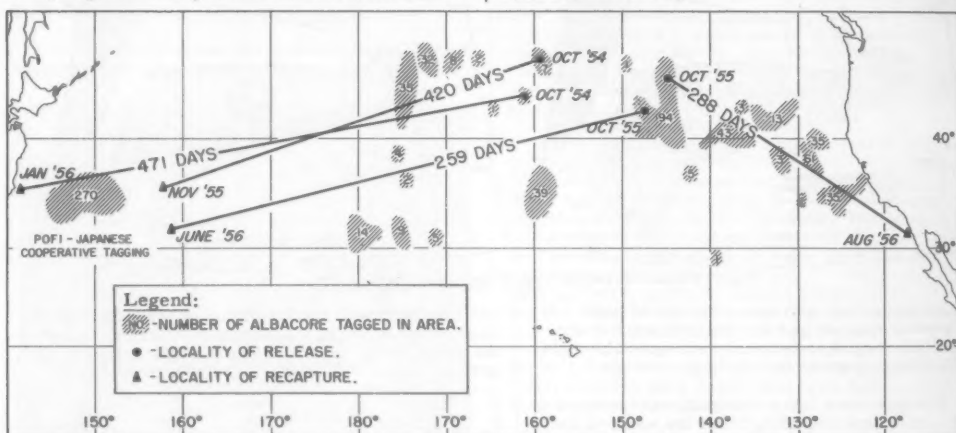


Fig. 4 - Albacore tagging.

was joined by the Hugh M. Smith on July 1, 1957. In addition nine commercial vessels were utilized in late July and early August to make a concentrated fishing survey of a band approximately 350 miles wide off the coast between Point Arguello, Calif., and Grays Harbor, Wash. During this phase of the survey the two research vessels will

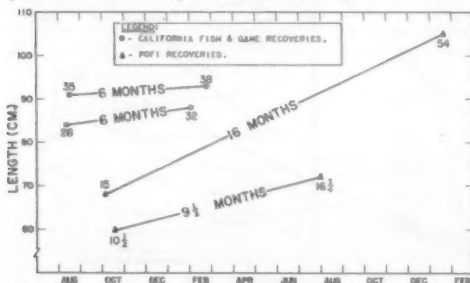


Fig. 5 - Albacore growth.

patrol the area collecting detailed oceanographic and biological data to attempt to determine the conditions which govern the occurrence and movement of the albacore.

**Tagging:** Four albacore tag recoveries have been reported, all of them rather long-term, the period of release ranging from 259 to 471 days. As shown in figure 4, all four fish were tagged in mid-ocean; three were recovered off the coast

In line with the policy of attempting to tag albacore over the entire North Pacific, POFI sent two biologists to Japan to conduct tagging and to instruct Japanese technicians in tagging methods. The Japanese showed great interest in this work, and with their help we were able to tag 270 albacore in the area indicated in figure 4. As a result of this motivation the Japanese have initiated a tagging program in their 1957 albacore live bait fishery with a goal of 1,500 releases. However, we have no data on the success of this program to date.

**Spawning and Maturity:** Examination of all ovary samples collected in the north and equatorial Pacific has been completed. There is no evidence of albacore spawning in the temperate waters in which the Japanese coastal and American coastal fisheries are conducted or in the temperate waters north of Hawaii. In these three areas all the fish taken have been either sexually immature or, in the case of the larger winter-caught fish, there is no evidence of ovary development.

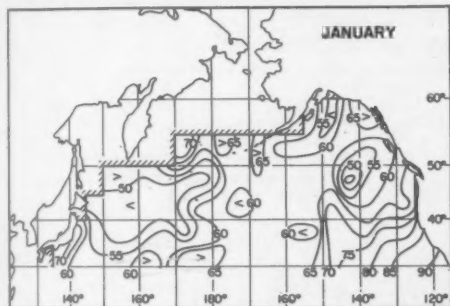
Good evidence has been found of albacore spawning in the subtropical Hawaiian waters and those to the south of the equator. In these areas the small, immature albacore so typical of the temperate waters have not been found.

From the above it is hypothesized that albacore are spawned in subtropical or tropical waters. During their second year of life they migrate to feeding grounds in temperate waters where they remain for two or more years. Following this

they return to the tropics to spawn. Thus an adequate understanding of the albacore fisheries may involve studies of the albacore population and its environment which encompasses the waters of the Pacific Ocean extending from 50° N. to well south of the equator.

Analysis of the landing records from the tuna cannery in American Samoa shows considerable albacore are now landed each month from the area ranging from the equator south to 28° S. latitude between longitudes 160° W. and 180°. These landings offer an opportunity to determine whether or not and at what season they spawn in this area and arrangements are being made to get a sampling program under way in Samoa.

**Age and Growth:** Albacore growth studies based on hard parts have forced us to conclude that it is not possible to age albacore from their scales or their bones for the following reasons:



conducted as a part of the albacore program. They should be of general interest to fishermen and research workers in the North Pacific. The operational analysis of the winds was completed and a pilot study was made to determine the feasibility of preparing synoptic charts of the sea surface temperature from the data contained in ship's weather reports.

The wind analysis was prepared, with the operational requirements of a small research ship or fishing vessel in mind, from unpublished data obtained from the U. S. Weather Bureau. The aim was to show the expectation of suitable fishing weather in the North Pacific in all areas and months of the year. Sample contour charts for January and July showing the percentage of wind observations of 20 knots or less are illustrated in figure 6.

As an example of their use, it may be determined from the July chart that, in the area from

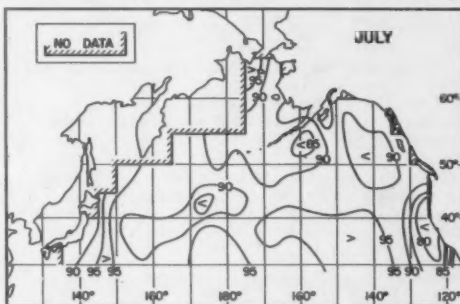


Fig. 6 - Frequency of fishing weather.

(1) the rings found on the scales and bones cannot be counted with reasonable consistency; (2) the increments that are noted do not appear to give either a reasonable or a consistent pattern of growth; and finally, (3) the results are not consistent with growth as evidenced by tag returns.

The best estimate of albacore growth stems from the tag recoveries. Even this evidence is not as good as we would like, for there have been rather few recoveries and there is always the problem of obtaining reliable measurements at the time of tagging and recovery. The best results we have, shown in figure 5, suggest a moderately rapid growth rate. The annual rate of increment for the several fish ranges from 6 to 27 pounds with the average closer to the lower value. Checking this material against hard parts has shed no light on the interpretation of the rings on the vertebrae and scales.

Perhaps one should not expect to be able to age albacore from the hard parts. They are not subject to the same extremes of summer and winter conditions as most fish of the north temperate zone, for they migrate to areas where food is available and water temperature is suitable for growth. Thus, as they seem to spend their life under fairly uniform conditions, "winter" rings would not necessarily develop on their scales and vertebrae.

**North Pacific Weather and Climate:** Two studies of North Pacific weather and climate were

145° W. to 175° W. longitude, between 43° N. and 49° N. latitude, suitable fishing weather is present during 90 percent of the month, i.e., 9 out of every 10 days. The *John R. Manning* made excellent gill-net catches in this area during July and August 1956. Her records showed that 109 out of 121, or 90 percent, of the 6-hourly wind observations made on board were 20 knots or less and also that 23 out of 26, or 89 percent, of the nights were suitable for gillnetting, thus illustrating the reliability of the charts.



The Service's exploratory fishing vessel *John N. Cobb*.

The quasi-synoptic charts of sea surface temperature are the result of an attempt to utilize

synoptic weather data for mapping the seasonal and annual changes in oceanographic conditions.

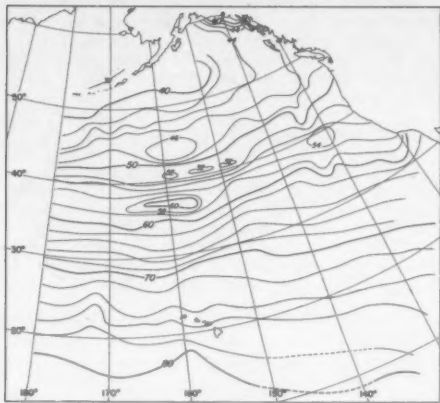
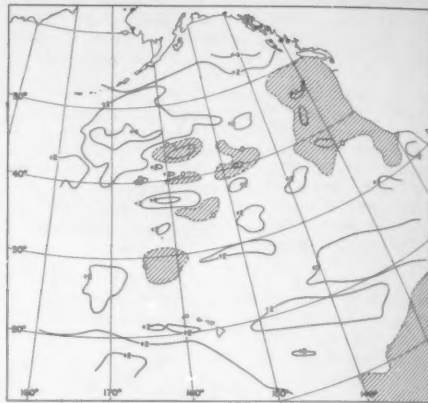


Fig. 7 - Quasi-synoptic chart of Northeastern Pacific surface temperature in °F. and deviations from normal in °F. for the April 11-20, 1957 period.

Surface temperature was selected rather than other parameters such as wind and pressure since it appeared to give a more direct measure of the net effect of climate and weather on the ocean. The intensified program of U. S. Weather Bureau during recent years to increase the quality and number of ships' reports made possible the preparation of accurate and detailed charts such as the sample chart (fig. 7) for the Northeastern Pacific April 11-20, 1957 period.

ation of accurate and detailed charts such as the sample chart (fig. 7) for the Northeastern Pacific April 11-20, 1957 period.



This chart is based on 1,883 individual observations and shows up both ocean wide and local deviations from normal in detail. The chart is confined to the Northeastern Pacific since the Japanese are already issuing similar charts for the Northwestern Pacific.

\* \* \* \* \*

**DISCOVERY OF "SKIPJACK HOLE" AIDS LARGE-SCALE TUNA TAGGING IN HAWAIIAN WATERS:** The discovery by U. S. Fish and Wildlife Service fishermen and scientists of a "skipjack hole" off the island of Lanai, where this tuna species can be found and fished practically all the time, has resulted in record numbers of releases and recaptures of tagged skipjack this summer, according to the Pacific Oceanic Fishery Investigations. Between July 3-13 the research vessel Charles H. Gilbert released 1,624 specimens of the small striped or skipjack tuna (known locally as aku) in a small area off Cape Kaea, Lanai, bringing to a total of 3,602 the number of skipjack tagged in Hawaiian waters this year. The fish are marked with a barb-pointed plastic tube inserted into the muscles of the back, a method developed at the Service's Honolulu Laboratory and being used for the first time this year. The Service biologists expect that recaptures of the tagged fish will clear up the mysteries surrounding the skipjack's annual summer migration into the Hawaii area, where it supports the Territory's most valuable commercial fishery.

Recoveries of the tuna tagged this year have been at a high rate, with 146 fish returned to date. The majority of these recaptures have been the work of two Maui sampans, the Olympic, which has brought in 67 tagged skipjack and the Amberjack, with 31 tags to its credit. Most of these fish had been at liberty only a short time, although some had carried their tags for more than two months.

Detailed studies are being made at the Lanai "skipjack hole" to find out what features of water temperature, salinity, plankton, or currents, and other conditions of the environment cause skipjack to congregate and remain more or less permanently resident there, in preference to other nearby spots, of apparently similar character, where they are rarely found. If the answer to this question can be discovered, it should be of value in determining the whys and wherefores of the pattern of skipjack occurrence in the open ocean. The site off Cape Kaea is thus a sort of



natural experimental laboratory, with the great advantage that the experimental animals, the skipjack, can pretty generally be relied upon to be there when the biologists want to work with them.



## Public Eating Places Fish Utilization

When a customer--whether he be in the north, south, east, or west--wants shellfish, his first choice is shrimp in two out of three of the Nation's public eating places which serve fish or shellfish, according to a survey by the Bureau of Commercial Fisheries.

But if he wants fish, and he lives in the northeastern part of the country, his choice in public eating places will be tuna, flounder, haddock, and halibut in the order named. If he lives in the north-central area, his choice will be ocean perch, pike, haddock, and catfish; in the south it will be catfish, sea trout, flounder, and cod; and in the west he will choose halibut, salmon, tuna, and flounder.

The study also indicates that fish or shellfish is the main dish in 17 percent of all meals served in the 208,100 eating places that serve fish and shellfish. But there are still 190,000 of the total 398,000 public eating places which for some reason do not serve fish or shellfish.

Replies to questions on fish portions (uniform servings of fish) to determine the most popular size of fish serving may be the key to efficient and streamlined packaging to cut down costs of producing too many different size portions. Also, supplying fish in proper serving portions may induce some of the 190,000 eating places that do not serve fish to put this nutritious and profit-making protein food on their menus.

The purpose of the survey was to secure information which would help the fishing industry improve old markets and develop new ones. Such research is part of a broad program which the Bureau of Commercial Fisheries is conducting for the benefit of both the fishing industry and the consumer.

The survey was made by the Bureau of the Census of the Department of Commerce for the Bureau of Commercial Fisheries. A representative sample of more than 4,500 public eating places was covered in the study. The work was financed by funds made available by the Saltonstall-Kennedy Act of 1954 for the improvement of the domestic fishery.

Note: The findings of the survey have been published in the report *Fish and Shellfish Consumption in Public Eating and Drinking Places*, Special Scientific Report, Fisheries No. 218



## Tuna

JOINT JAPANESE-AMERICAN CANNED TUNA ADVERTISING MEETING IN LOS ANGELES: Representatives of the Japanese tuna industry and the American tuna canning industry met in Los Angeles, Calif., on August 15 and 16 to discuss the possibility of a joint advertising campaign to promote the increased sale of canned tuna in this country. Attendance was by invitation only.

At the request of the domestic tuna canning industry, Donald L. McKernan, Director of the Bureau of Commercial Fisheries of the U. S. Fish and Wildlife Service, presided as chairman during the meetings. In addition to McKernan, the



Department of the Interior was represented by William Redmond of the Solicitor's Office, Harry Shooshan of the Technical Review Staff, and Donald Aska of the Bureau of Commercial Fisheries, all of Washington, D. C. The Japanese Consul at Los Angeles and S. Ross Hatton, a Bureau of Commercial Fisheries representative stationed at San Pedro, Calif., attended as observers. A representative of the Federal Trade Commission also was expected to meet with the group.

The following committee was selected by the domestic tuna canners: Charles R. Carry, Executive Director, California Fish Cannery Association, Terminal Island, Calif.; Ed. L. Morris, Director, Tuna Research Foundation, Terminal Island, Calif.; M. J. Gorby, California Marine Curing & Packing Company, Terminal Island, Calif.; Donald P. Loker, Star-Kist Foods, Inc., Terminal Island, Calif.; John McGowan, Columbia River Packers Assn., Astoria, Ore.; Arthur Mendonca, F. E. Booth Company, Inc., San Francisco, Calif.; and William Dugan, Van Camp Sea Foods Company, Terminal Island, Calif.

The Japanese tuna industry was represented by the following: Takechiyo Matsuda, President, International Tuna Association of Japan and a member of the Japanese House of Representatives; Tatsuro Kanbe, resident officer in New York of the International Tuna Association of Japan; Ichiro Miyake, Deputy-Director, National Frozen Food Export Marine Industry Assn., and also Executive-Director of the Japan Cold Storage Co.; Yoshihiro Adachi, Managing Director, National Frozen Food Export Marine Industry Assn.; Hiroto Aramaki, interpreter (resident officer in Los Angeles of the Taiyo Fisheries Co.); Tomohachi Ueda, Director, Japan Canned Tuna Export Marine Industry Association, and also President, Shimizu Foodstuff Co.; Takeo Baba, Managing Director, Japan Canned Tuna Export Marine Industry Association; and Fumio Kinoshita, resident officer in New York of the Japan Canned Tuna Distributing Co.



### U. S. Fish Stick Production

APRIL-JUNE 1957: United States production of fish sticks during the second quarter of 1957 totaled 11.4 million pounds, according to the Bureau of Commercial Fish-

Table 1 - U. S. Production of Fish Sticks, April-June 1957

Month	Cooked	Raw	Total
	(1,000 Lbs.)		
April .....	4,024	479	4,503
May .....	2,971	401	3,372
June .....	3,118	422	3,540
Total 2nd quarter 1957 .....	10,113	1,302	11,415
Total 2nd quarter 1956 .....	10,022	1,202	11,224
Total 1st 6 months 1957 .....	23,294	2,807	26,101
Total 1st 6 months 1956 .....	24,339	3,152	27,491

eries of the U. S. Fish and Wildlife Service. Compared with the second quarter of last year, this was an increase of 191,000 pounds or 2 percent.

Production in the Atlantic Coast States made up 84 percent of the total. Inland, Gulf, and Pacific Coast states accounted for the remaining 16 percent.

Of the total production in the second quarter, 10.1 million pounds, 89 percent, were cooked and 1.3 million pounds, or 11 percent, were raw fish sticks.

During the first 6 months of 1957, a total of 26.1 million pounds of fish sticks was produced. Compared with the same period of last year, this was a decline of 1.4 million pounds.

Table 2 - U. S. Production of Fish Sticks by Areas, April-June 1957-56

Area	April-June			
	1957		1956	
	Number of Firms	1,000 Lbs.	Number of Firms	1,000 Lbs.
Atlantic Coast States .....	25	9,557	27	9,080
Inland & Gulf States .....	5	948	6	1,242
Pacific Coast States .....	11	910	10	902
Total .....	41	11,415	43	11,224

The largest quantity of fish sticks produced during a single month of 1957 occurred during February with 5.3 million pounds. March followed with 5.1 million pounds.

Note: Also see Commercial Fisheries Review, May 1957 p. 40.



### U. S. Foreign Trade

**EDIBLE FISHERY PRODUCTS, MAY 1957:** United States imports of edible fresh, frozen, and processed fish and shellfish in May 1957 were lower by 5.1 percent in quantity but 18.6 percent higher in value as compared with the previous month. Compared with May 1956, the imports for this May were up 5.0 percent in quantity and 17.9 percent in value. Included in the imports this May were more of the higher-priced commodities like shrimp, spiny lobster, and scallops since imports for May 1957 averaged 34 cents a pound as compared with 31 cents a pound for the same month in 1956.

United States Foreign Trade in Edible Fishery Products, May 1957 with Comparisons						
Item	Quantity			Value		
	May		Year	May		Year
	1957	1956	1956	1957	1956	1956
	(Million of Lbs.)			(Millions of \$)		
<b>Imports:</b>						
Fish & shellfish:						
Fresh, frozen & processed 1/.....	59.4	56.6	786.6	20.4	17.3	231.6
<b>Exports:</b>						
Fish & shellfish:						
Processed <sup>1</sup> / only (excluding fresh & frozen .....	5.5	4.7	82.8	1.0	0.9	19.2
1/ Includes pastes, sauces, clam chowder and juice, and other specialties.						

May 1957 imports were up as compared with the same month last year because of increased imports of frozen fillet blocks, frozen wolffish fillets, shrimp, scallops, frozen spiny lobsters, and canned tuna. These increases were not offset by lower imports of canned sardines, canned salmon, canned crab meat, groundfish fillets, frozen tuna, and bonito.

Exports of processed edible fish and shellfish in May 1957 increased about 72.6 percent in quantity from the previous month and were also 15.9 percent above April 1956. The May 1957 value of these exports was up by 42.9 percent as compared with the previous month, and higher by 11.1 percent from the same month a year ago.

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**GROUND FISH FILLET IMPORTS, JULY 1957:** During July 1957, imports of groundfish fillets and blocks amounted to 15.4 million pounds. Compared with the same month last year, this represented a decrease of 666,000 pounds or 4 percent.

The principal cause for this decline was a 2.5-million-pound drop in imports from Canada.

Icelandic exports to the United States increased 1.4 million pounds. Imports from Norway, Denmark, the Netherlands, West Germany, and Greenland, compared with July 1956, represented a net increase of 659,000 pounds. This gain, however, was not great enough to offset the over-all decline caused by the sharp drop in imports of Canadian fillets. There were no imports of groundfish fillets from Miquelon and St. Pierre during July 1957 although 162,000 pounds were reported during the same month of last year.

Imports of groundfish and ocean perch fillets and blocks into the United States during the first seven months of 1957 totaled 81.9 million pounds--a decrease of 700,000 pounds as compared with the corresponding period of 1956. Canada led all other countries exporting fillets to this country with 60.8 million pounds. Iceland followed with 14.2 million pounds. The remaining 6.9 million pounds was accounted for by Norway, Denmark, the United Kingdom, the Netherlands, France, West Germany, Greenland, and Miquelon and St. Pierre.

Note: See Chart 7 in this issue.

\* \* \* \* \*

IMPORTS AND EXPORTS OF SELECTED FISHERY PRODUCTS, JANUARY-MAY 1956-57: A summary of imports and exports of fishery products during the first five months of 1957, prepared by the Bureau of Commercial Fisheries, shows substantial increases over the same period for 1956 for many items (see table).

Commodity	January-May		Percentage Increase (+) or Decrease (-)
	1957	1956	
	.. (1,000 Lbs.)..		.. (Percent)..
<u>Imports:</u>			
Tuna, fresh and frozen .....	55,751	58,900	- 5
Tuna, canned in oil .....	433	245	+ 77
Tuna, canned in brine .....	16,007	13,579	+ 18
Bonito, canned in oil .....	5,365	5,426	- 1
Salmon, fresh and frozen .....	2,725	1,566	+ 74
Salmon, canned .....	7,161	10,480	- 32
Sardines, canned in oil .....	7,838	8,182	- 4
Sardines, not canned in oil .....	596	276	+166
Shrimp .....	23,732	26,123	- 1
Lobsters, fresh and frozen .....	22,519	20,332	+ 11
Fillets, (including blocks) of groundfish and ocean perch .....	55,998	55,443	+ 1
Swordfish .....	5,910	6,607	- 11
	.... (Tons)....		
Fish meal .....	39,971	51,167	- 22
<u>Exports:</u>			
	.. (1,000 Lbs.)..		
Salmon, canned .....	1,199	662	+ 84
Mackerel, canned .....	10,497	not available	
Sardines, canned, not in oil .....	8,145	20,676	- 61
Fish oils, inedible .....	55,740	45,995	+ 21

\* \* \* \* \*

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA PROVISIO: The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1957 at the 12½-percent rate of duty is limited to 44,528,533 pounds. Any imports in excess of that quantity will be dutiable at 25 percent ad valorem.

Imports under the quota from January 1-June 29, 1957, amounted to 17,764,752 pounds, according to data compiled by the Bureau of the Customs. This leaves a balance of 26,763,781 pounds of the quota which may be imported during the balance of 1957 at the 12½-percent rate of duty.



### Virginia

**FISHERMEN URGED TO WATCH FOR TAGGED FISH:** Sports and commercial fishermen are urged to watch for bright red discs on the fish they catch this year in the Middle Atlantic States. The tags are being attached by the Virginia Fisheries Laboratory at Gloucester Point, Va.

Tags carry the following words: "Virginia Fisheries Lab., Gloucester Point, Va. Reward." On the reverse side is a serial number. Records at the Virginia Fisheries Laboratory show where and when each tag was attached.

Fishermen who catch a tagged fish should return the tag as soon as possible to the Laboratory at Gloucester Point, telling where and when the fish was caught. In return they will receive a 25¢ reward and information on where the fish was tagged, how far it had traveled, and how long its trip took.

Since April more than 1,000 croakers, spot, and flounders have been tagged, and about 50 of these tags have been returned by fishermen. Most of these fish did not travel far, but greater wanderings are expected as time goes on. One tagged croaker was found in a fish market in Pittsburg, Pa. and another in Roseboro, N.C., but both of these probably were caught in Chesapeake Bay.

The Laboratory also tagged numbers of striped bass (rockfish) last spring in cooperation with the U. S. Fish and Wildlife Service. The labels on these tags say "Fish & Wildlife Serv., Wash. D. C. \$1 Reward." There is also a serial number on the reverse side. About 1,400 striped bass were tagged in Virginia this year, and about 85 of these have been returned. The longest migration to date was from the York River to Rock Hall near Baltimore. The Fish and Wildlife Service tags also can be returned to the Gloucester Point Laboratory.

Tags have been attached to the fish by a stainless steel pin, or with a nylon filament. With the pin, a blank disc is used at the crimped end.



### Wider Dissemination of Simple Fish Recipes Recommended by Marketing Survey

Frying is the most common way of cooking fish. About three out of four housewives prepare fish in this way, a West Coast fish marketing and consumption survey revealed. Yet a leading reason for not serving fish more often or not using it at all was the housewife's objection to the odors caused largely by the frying method.

Asked about reasons why they don't buy more fish, twice as many housewives complained about fish-cooking odors than about fish prices, according to this survey recently made by Oregon State College for the United States Fish and Wildlife Service with Saltonstall-Kennedy funds.



Industry groups, magazines, newspapers, and food editors, as well as others have put out numerous fish cookery recipes using broiling, baking, and poaching methods. The survey recommends the much wider distribution of good simple recipes using these methods rather than frying as a means of promoting fish consumption.

The survey also recommends that the budgets for advertising fresh and frozen fishery products be increased because it was found that the present budgets were well below one percent of sales—a low figure compared with other food industries. A stepped-up educational campaign directed toward better fish cookery would pay off well in terms of improved sales.



### Wholesale Prices, July 1957

The July 1957 over-all edible fish and shellfish (fresh, frozen, and canned) wholesale price index (119.9 percent of the 1947-1949 average) was up 2.3 percent as compared with the previous month and also higher by 4.6 percent from July 1955.

From June to July, higher prices for fresh large drawn haddock (up 24.6 percent), Pacific Coast halibut (up 13.8 percent), and Great Lakes yellow pike (up 60.9 percent), more than offset lower prices for fresh-water round and drawn

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, July 1957 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ (\$)		Indexes (1947-49=100)			
			July 1957	June 1957	July 1957	June 1957	May 1957	July 1956
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned) . . . . .					119.9	117.2	117.0	114.6
<u>Fresh &amp; Frozen Fishery Products:</u> . . . . .					133.3	128.5	128.2	125.9
<u>Drawn, Dressed, or Whole Finfish:</u> . . . . .					122.5	111.2	107.9	122.5
Haddock, lge., offshore, drawn, fresh . . . . .	Boston	lb.	.09	.08	95.3	76.5	77.4	92.2
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.37	.33	114.5	100.6	89.0	122.2
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.63	.62	140.5	139.3	145.2	142.7
Whitefish, L. Superior, drawn, fresh . . . . .	Chicago	lb.	.53	2/.63	130.2	154.9	166.1	119.0
Whitefish, L. Erie pound or gill net, rnd., fresh .	New York	lb.	.55	.88	111.2	176.9	161.8	131.4
Lake trout, domestic, No. 1, drawn, fresh . . .	Chicago	lb.	.61	.60	125.0	121.9	106.5	122.9
Yellow pike, L. Michigan & Huron, rnd., fresh .	New York	lb.	.70	.44	164.1	102.0	82.1	126.7
<u>Processed Fresh (Fish &amp; Shellfish):</u> . . . . .					141.7	140.6	143.2	128.6
Fillets, haddock, sml., skins on, 20-lb. tins . .	Boston	lb.	.30	.30	100.4	102.1	108.9	112.3
Shrimp, lge. (26-30 count), headless, fresh . .	New York	lb.	.95	.94	150.1	147.8	151.7	126.4
Oysters, shucked, standards . . . . .	Norfolk	gal.	5.75	5.75	142.3	142.3	142.3	136.1
<u>Processed, Frozen (Fish &amp; Shellfish):</u> . . . . .					129.0	130.1	130.9	117.7
Fillets: Flounder, skinless, 1-lb. pkg. . . . .	Boston	lb.	.39	.40	102.1	103.4	103.4	102.1
Haddock, sml., skins on, 1-lb. pkg. . . . .	Boston	lb.	.27	.29	83.2	91.0	92.6	86.3
Ocean perch, skins on, 1-lb. pkg. . . . .	Boston	lb.	.27	.28	108.8	112.8	114.8	109.8
Shrimp, lge. (26-30 count), 5-lb. pkg. . . . .	Chicago	lb.	.97	.95	149.3	145.8	145.8	126.6
<u>Canned Fishery Products:</u> . . . . .					100.8	101.2	101.2	98.7
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs. .	Seattle	cs.	22.65	22.65	120.0	120.0	120.0	120.0
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs. . . . .	Los Angeles	cs.	11.20	11.20	80.8	80.8	80.8	76.4
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs. . . . .	Los Angeles	cs.	9.00	9.00	105.0	105.0	105.0	87.5
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans cs. . . . .	New York	cs.	7.45	7.70	79.3	81.9	81.9	87.3

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

2/Revised.



whitefish (down 37.1 and 15.9 percent). Other changes in the fresh fish varieties entering the drawn, dressed, and whole fish subgroup were slight. The July 1957 index for this subgroup increased by 10.2 percent over June this year. Compared with the same month a year ago, the July 1957 subgroup index was unchanged. Fresh halibut, salmon, and round Lake Erie whitefish were lower this July as compared with July 1956, but increases of 1.7 to 29.5 in the other four items balanced out these declines. Supplies of Lake Erie round whitefish improved this July as compared with the previous month and the same month a year ago, but yellow pike supplies were lower for the same periods.

Fresh processed fish and shellfish prices in July were higher by a fraction of 1 percent as compared with the previous month due to slight increases for small haddock fillets at Boston and fresh headless shrimp at New York. Compared with July 1956, prices for fresh processed fish and shellfish were higher by 9.6 percent this July. Lower fresh haddock fillet prices (down 10.6 percent) were more than offset by an increase of 18.8 percent in fresh shrimp prices and a 4.6 percent increase in oyster prices.

There were only slight changes (down 0.8 percent) in the wholesale prices for the frozen processed fish and shellfish

from June to July. Lower frozen fillet prices at Boston (down about 0.8-8.6 percent) were offset largely by continuing firm frozen shrimp prices which were up 2.4 percent. However, the subgroup index this July was higher by 9.6 percent than for the same month in 1956 due primarily to a 17.9-percent increase in frozen shrimp prices at Chicago.

Canned fishery products in July were down slightly (0.4 percent) from June due to a drop in the canners' price for Maine sardines. Catches of Maine sardines were good during July and price declines for the canned product forced some plants to curtail production. The subgroup index this July was higher by 2.1 percent as compared with the same month in 1956. Canned Maine sardines were lower by 9.2 percent this July as compared with July 1956 but higher canned tuna and California sardine prices more than compensated for this decline. As of the end of July prospects were good for an increased pack of Maine sardines, the canned salmon pack was running about 20 percent lower than a year ago this July, and the domestic canned tuna pack was lower, but still at a high level, with the market upset due to fluctuating raw tuna prices and heavy imports.



#### COLLEGE TRAINING COURSES FOR FOOD INDUSTRY PERSONNEL

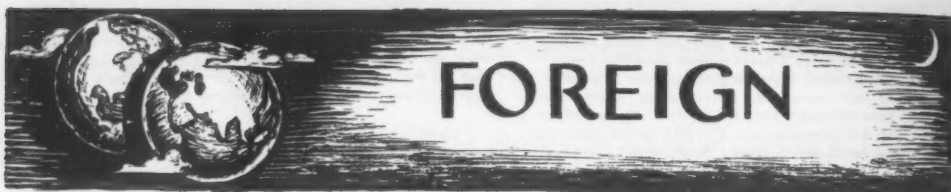
Plans to expand the college training program for personnel development in the food industry were announced at a supplier-distributor meeting at Michigan State University early in May, according to a trade journal. Michigan State is the only University in the country which offers courses in food distribution in which students can earn a bachelor or master degree.

Six food-chain organizations originally contributed \$100,000 in 1950 to make possible the curriculum at Michigan State. Many food companies are providing scholarships of \$1,000 for the employees of the food industry. According to one of the firms which supplied scholarships, "All management is seriously concerned with constantly rising costs, but we have seen many good plans for reducing costs go astray because of the inadequate executives below the top level. We believe that many store managers and supervisors could get that necessary vision, experience, association, and education here and they do."

The article went on to say that one company was allocating scholarships from funds previously used for Christmas gifts to customers. A number of customers he said had requested that the company refrain from sending Christmas gifts. "We sent everyone on our list a letter extending Christmas greetings and stating that in place of a gift we were using the money for a scholarship which would benefit the industry in the entire country."

Another food executive stated that "the growth of the industry in the past 30 years and its increased competition demand that we bring into our company and train young executives capable of meeting the problems which go along with these factors. We need specialists who know automation, communication, marketing, and other fields. We need executives with broader interest who can become well-rounded general executives."

Certainly the fishing industry is not without its personnel problems and either individually or through their associations may wish to investigate the possibility of training some of their selected personnel in these food distribution courses.



### International

#### NORTHWEST ATLANTIC FISHERIES COMMISSION

**SEVENTH ANNUAL MEETING:** The Seventh Annual Meeting of the International Commission for the Northwest Atlantic Fisheries (ICNAF) was held in Lisbon, Portugal, May 20-25, 1957.

This is the first time that an annual meeting has been convened outside the North American continent. In the Convention of 1949 it was stated that annual meetings should be held in North America, but an amendment effected in 1957 made it possible to hold annual meetings in any of the member countries.

The Annual Meeting was preceded by a two-day meeting of the Standing Committee on Research and Statistics. In the week following the Annual Meeting a joint workshop was held by FAO, ICES, and ICNAF to consider a series of problems relating to population dynamics and selectivity of fish gear.

Commissioners, most of them accompanied by advisers, were present. Observers attended from the Federal Republic of Germany, the Union of Soviet Socialist Republics, the Food and Agriculture Organization of the United Nations, Conseil Permanent International pour l'Exploration de la Mer, the International Fisheries Convention of 1946, and the International North Pacific Fisheries Commission.



The German delegation of observers informed the Commission that the German Parliament had now ratified the adherence of Germany to the International Convention for the Northwest Atlantic Fisheries; and that when Germany, in the very near future, became a member of the Commission it would wish to have membership in Panel 1 (West Greenland).

The Standing Committee on Finance and Administration proposed a budget for 1957/58 of C\$45,175; in the budget expenses were included for a superannuation plan for staff members to become effective during the year. The Commission adopted the budget.

In the meetings of the five panels the research work carried out in the past year was reviewed and plans for future work were discussed. It was noted that several countries had extended their research and that further expansion was to be expected.

In Panels 3, 4, and 5 the measures taken by separate countries to enforce the regulations of the trawl fisheries for cod and haddock were considered. The problem of necessary protection of the trawl cod end was dealt with, and a proposal for an amendment was referred to the Plenary Session.

In Panel 4 the question of a further increase of cod-end mesh size aiming at the achievement of greater sustained yields was considered. Based on recommendations from the panel's group of advisers, it was agreed that more research should be carried out before further action could be taken.

Panel 5 considered the growing fishery for scallops (*Pecten*), especially by Canada. Collaboration on research between Canada and the United States was outlined; it was recommended to obtain the opinion of the Depositary Government as to whether scallops fall within the terms of jurisdiction of the Commission.

The United States reported that the regulations of the haddock trawl fisheries in Subarea 5, which had been in effect since 1952, had resulted in substantial savings of small haddock, an increase in size by age of haddock landed, and considerable increases in the quantities of haddock landed. These results had been so clearly shown by the extensive research carried out that the panel decided that part of the special research, carried out since 1952, could be suspended, to be reintroduced only if further analysis made it desirable.

The reports by the panels were considered and approved by the Commission in its Plenary Sessions.

The Standing Committee on Research and Statistics dealt with a series of questions related to the collection and publication of statistics and the planning and utilization of hydrographic and biological investigations and with a great variety of problems connected with the conservation of fish stocks. The Committee noted that the research reports for 1956 "show a gratifying advance in the magnitude of the Commission's research program. This increase has resulted largely from the interest of the several countries in problems of the Convention Area. It is particularly gratifying to note the increasing amount of coordination of research through meetings and exchange visits of scientists, and through joint investigations of the international problems with which the Commission is concerned."

An ad hoc committee dealt with matters of administration and management especially relating to the enforcement regulations of fisheries by member countries; it recommended measures to ensure that the Commission was duly informed by the member countries about their laws giving effect to the regulations of fisheries, their annual inspections, and the results of them. The recommendation was approved by the Commission.

It was decided that the 1958 Annual Meeting be held in Halifax, Canada, beginning on June 9, 1958.

In the week following the meeting, the Joint Workshop by FAO, ICES, and ICNAF took place in Estoril. A series of Plenary Sessions and of meetings of working groups took place; population dynamics and selectivity of fishing gear were the main subjects for consideration.

The Joint Workshop dealt not only with the problems themselves, the results achieved and the planning of further investigations, but also with the more technical aspects of the work, the best ways for coordination of methods, for compilation of data, and for distribution (publishing) of results.

Extensive proceedings of the findings of the meetings were distributed at the final Plenary Session, and it is planned that a final report shall be published by FAO.

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ITALY RATIFIES PROTOCOL AMENDING THE NORTHWEST ATLANTIC FISHERIES CONVENTION: Italy on June 7, 1957, deposited ratification of the protocol amending the International Convention for the Northwest Atlantic Fisheries of February 8, 1949, done at Washington, D. C., June 25, 1956.

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**GERMAN FEDERAL REPUBLIC ADHERES TO NORTHWEST ATLANTIC FISHERIES CONVENTION:** On June 27, 1957, the Federal Republic of Germany deposited its adherence to the International Convention for the Northwest Atlantic Fisheries, dated at Washington February 8, 1949, and entered into force July 3, 1950. On the same date the German Federal Republic also deposited its adherence to the Protocol amending the Convention, done at Washington June 25, 1956, but not in force yet.

#### FOOD AND AGRICULTURE ORGANIZATION

**TONS OF DEAD FISH FOUND FLOATING IN ARABIAN SEA:** Several million tons of dead fish were floating in the Arabian Sea between  $60^{\circ}$ - $70^{\circ}$  E. and  $10^{\circ}$ - $12^{\circ}$  N., according to a report sent to the Food and Agriculture Organization (FAO) by Professor P. Moiseev of the State Institute of Oceanology and Marine Fisheries, Moscow. Available data were insufficient for making an accurate estimate of the quantity of fish killed, but it was clear that this was a large-scale catastrophe.

"According to the information from Moscow, based on reports from a Russian ship sailing through the Arabian Sea, there were about 10 dead fish to the square metre," said Taivo Laevastu, oceanographer of FAO's Fisheries Division. "The area of mortality as reported covers about 200,000 square kilometres. The fish are reported to be 20 to 25 centimetres in length, and fish of this size generally weigh at least 100 grams.



"If we could assume only one-tenth of the area reported is covered with the dead fish at a density of 10 to the square metre, the total is 20,000,000 tons, which is almost equal to the world's yearly commercial catch of marine fish.

"The trouble is that we do not know how well this figure of 10 per square metre holds for the entire area. Assumption that the entire area was covered like this would mean mortality of 200 million tons of fish. This seems unlikely, although, to tell the truth, we cannot reject the possibility. But even if the figure of 10 to the square metre were true for only  $\frac{1}{100}$  of the area, the resultant two million tons would represent a great catastrophe."

Mass death of fish occurs from time to time in many parts of the world, the FAO official said.

"The present catastrophe may have been caused by a layer of water known as the 'tropical subsurface oxygen minimum.' Sometimes this layer lies no more than 50 to 75 meters below the surface. The upwellings which take place along the divergent lines of currents, following the changes in the monsoon in April, May and November, often lead to the growth of rich crops of phytoplankton. Sardines, mackerel, tuna, and other fish tend to migrate from, presumably, the Indian Ocean to graze on the phytoplankton. Then conditions may favor particularly strong upwellings which bring the tropical subsurface oxygen minimum layer to the top and the fish are killed through lack of oxygen."

Whatever information can be gathered about the present disaster will be studied with intense interest by fishery biologists and by all those concerned with the fisheries of the area and of the Indian Ocean.

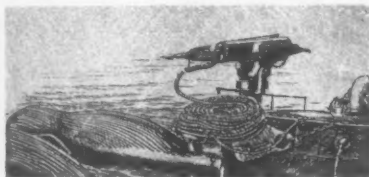
"The important aspect of the present report is that the undoubted magnitude of the catastrophe provides evidence to support the view that the Arabian Sea and the Indian Ocean are rich in fish resources," Laevastu said. "It seems unquestionable that for part at least of this area of the Arabian Sea there were fish in density ex-

ceeding 1 kilogram per square metre. Concentrations of pilchards in the North Sea as high as one kilogram to the square metre have been observed, but only occasionally, and not covering the vast area reported in this case in the Arabian Sea."

"The report is of interest from another point of view. If the fish are--as seems possible--Indian mackerel, the observation of this mortality may be evidence of the migratory path of this species from the fisheries off the coast of West Pakistan and India," continued Laevastu. "If this should prove to be true, we may find that this evidence on mortality and migrations will contribute valuably to analyzing the fluctuations that are a feature of these fisheries. In any case, mortality on the scale reported must severely deplete the stock and it could easily be that it will take several years for the stock to recover its abundance. This fact may perhaps be established by the catches made by Indian and Pakistani fishermen during the next two years."

### WHALING

**WORLD WHALE AND SPERM OIL OUTPUT IN 1957:** World whale oil production in 1957 is forecast at 435,000 short tons and sperm oil output at around 90,000 tons. The forecast for whale oil is somewhat higher in 1957 than in 1956, even though the Antarctic pelagic catch limit for the 1956/57 Antarctic whaling season was reduced by 500 blue-whale units from 1955/56. The forecast for sperm oil output is nearly one-fifth less than last year's preliminary estimate.



Antarctic pelagic whaling (including production of South Georgian shore stations) which ended March 16, accounted for about 85 percent of the forecast world production of whale oil in 1957. This year's Ant-

Table 1 - Whale and Sperm Oil Estimated World Production, Annual 1955-57

Country	Whale Oil			Sperm Oil		
	1957 <sup>1/</sup>	1956 <sup>2/</sup>	1955 <sup>3/</sup>	1957 <sup>1/</sup>	1956 <sup>2/</sup>	1955 <sup>3/</sup>
(1,000 Short Tons)						
Norway . . . . .	171	136	138	20	25	26
United Kingdom . . . . .	66	76	77	6	12	11
Japan . . . . .	95	83	73	25	27	23
Netherlands . . . . .	16	16	11	1	3	1
Union of South Africa . . . . .	21	20	21	4	9	6
Soviet Union . . . . .	28	29	33	15	15	15
Panama . . . . .	-	27	27	-	3	4/
Australia . . . . .	18	18	18	-	-	-
Argentina . . . . .	9	8	9	4/	4/	4/
Chile . . . . .	3	3	3	4	4	3
Portugal . . . . .	-	-	-	4	4	4
Others . . . . .	8	7	8	11	8	8
World Total . . . . .	435	423	418	90	110	97
<sup>1/</sup> FORECAST, PRODUCTION OF SOME COUNTRIES ENDS ABOUT SEPTEMBER. <sup>3/</sup> REVISED. <sup>2/</sup> PRELIMINARY. <sup>4/</sup> LESS THAN 500 TONS. NOTE: COMPILED FROM OFFICIAL AND UNOFFICIAL SOURCES.						

arctic catch exceeded the internationally agreed limit of 14,500 blue-whale units by 237 units. In 1955/56, the Antarctic catch of 14,875 blue-whale units was 125 less than the agreed limit of 15,000 units.

While 1956/57 Antarctic sperm oil production was down almost one-third from last season, the whale oil output from the Antarctic pelagic season was up. With oil yield per blue-whale unit in 1956/57 at 127.9 barrels, compared with 121.6 barrels in the previous season, production was up even though fewer units were caught in 1956/57.



A total of 20 expeditions--one more than last season--participated in Antarctic whaling during the 1956/57 season, which lasted 69 days, or 11 days more than the previous season. The total catcher boats was 225, or 32 less than the previous season. This reduction in the number of boats was a result of an agreement between Norwegian, British, Japanese, and Dutch whaling interests to limit the number to 210. Actually, 207 boats were employed by these 4 countries and the Union of South Africa, while the Soviet Union has 18 catchers operating with its single floating factory.

The Union of South Africa's 1956/57 expedition was its final Antarctic whaling venture at least for the next 5 years. The floating factory Abraham Larsen has been sold to Japanese interests with an understanding on the part of the Union to refrain from Antarctic whaling for that period. However, offshore whaling by the Union will continue.

Table 2 - Whale and Sperm Oil Antarctic Pelagic Production, <sup>1/</sup> 1955/56 and 1956/57

Country	Whale Oil		Sperm Oil		Total Oil	
	1956/57 <sup>2/</sup>	1955/56 <sup>3/</sup>	1956/57 <sup>2/</sup>	1955/56 <sup>3/</sup>	1956/57 <sup>2/</sup>	1955/56 <sup>3/</sup>
			(Short Tons)			
Norway . . .	160,027	122,793	18,250	24,548	178,277	147,341
United Kingdom	4/ 57,065	64,366	5,318	12,105	62,383	76,471
Japan . . . .	78,273	90,582	13,722	15,772	91,995	106,354
Union of						
South Africa	15,175	15,059	5/ 745	5,386	15,920	20,445
Netherlands .	16,359	15,901	5/ 1,300	3,410	7/ 17,659	19,311
Soviet Union .	24,476	26,723	6/	1,972	7/ 24,476	28,695
Total . . .	351,375	335,424	39,335	63,193	390,710	398,617

1/ DOES NOT INCLUDE PRODUCTION OF 3 SOUTH GEORGIA SHORE STATIONS.

2/ PRELIMINARY.

3/ REVISED.

4/ INCLUDES PRODUCTION OF FORMER PANAMANIAN SHIP OLYMPIC CHALLENGER NOW OPERATED BY JAPANESE.

5/ ESTIMATE, BASED ON DATA THROUGH MARCH 3.

6/ NOT REPORTED.

7/ DOES NOT INCLUDE SPERM OIL PRODUCTION.

NOTE: COMPILED FROM OFFICIAL AND UNOFFICIAL SOURCES.

Argentine whaling interests--which have been operating the South Georgia Coast Station of Grytviken under a lease from the United Kingdom--have declared that they will not resume operations in 1957/58 unless an adjustment of the regulations governing foreign exchange earnings ("aforo") is made by the Government of Argentina.

Japan had 5 floating factories in the Antarctic in 1956/57, 2 more than last season. The floating factory Olympic Challenger, which last year was under the flag of Panama, this season operated under the Japanese flag, and a new floating factory, the Matsushima Maru was added. In 1957/58, with the addition of the Abraham Larsen, Japan expects to operate a total of 6 floating factories. Earlier plans to purchase the British ship, Southern Venturer, did not materialize. Pressure was reportedly exerted by the Japanese Government on the prospective buyers to refrain from further increasing the Japanese whaling industry at the present time.

At a meeting in Norway in March 1957, representatives from Japan, the United Kingdom, the Netherlands, and Norway drafted an agreement to place a neutral observer aboard each floating factory taking part in future Antarctic whaling. The draft agreement has been submitted to interested governments for final ratification. The Soviet Union declined an invitation to take part in the meeting. (Foreign Crops and Markets, July 1957, U. S. Department of Agriculture.)

NOTE: ALSO SEE COMMERCIAL FISHERIES REVIEW, SEPTEMBER 1956, P. 53.

## INTERNATIONAL WHALING COMMISSION

REPORT ON 1957 MEETING: Whale Catch Quota for 1957/58 Season: The Antarctic pelagic whale catch for the 1957/58 season has been set at 14,500 blue-whale units, the same as for last season. This was the result of discussions in London late in June by the International Whaling Commission at its regular annual meeting. The total catch for the 1956/57 Antarctic season exceeded the permissible limit by 237 units.

The Commission's scientific committee recommended a reduction, but the Commission decided that the limit should stand for another year in view of all the economic and practical factors involved, points out The Fishing News (July 5, 1957), a British trade periodical.

The Commission will meet next at The Hague on June 23, 1958

Whale Oil Production 1956/57: The 1956/57 Antarctic whale catch, including land stations, yielded 2,245,435 barrels of oil, including sperm oil. (Six barrels equal one ton.) The 1956/57 season yield was 61,734 barrels below the previous season. Twenty factoryships took part, with 225 catchers.

Outside the Antarctic, the 1956 output was about 605,189 barrels, compared with 520,090 the year before.

Tagging: A total of 225 whales were marked in the Antarctic before the start of the 1956/57 season. A further 50 were marked by the U.S.S.R., and about 500 in Australia and New Zealand.

Among the 56 marks recovered so far this season was one which had been in a whale for 22 years. Another showed that a blue whale had moved 1,900 miles in not more than 47 days.

Russia's Big Factoryship: The keel of what is claimed will be the world's largest whaling ship, of 45,000 tons, has been laid at a Russian shipyard, according to the Moscow radio.

Catcher Boat Limitations: Although Japanese and Dutch whaling companies have refused to prolong last year's international agreement on the limitation of the number of catcher boats in the Antarctic, the Norwegian whaling expeditions are not likely to use more boats for this season, a Norwegian shipowner stated in Oslo.

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SEVERAL COUNTRIES RATIFY PROTOCOL AMENDING THE INTERNATIONAL WHALING CONVENTION: A number of countries recently deposited ratification of the protocol amending the International Whaling Convention of 1946, done at Washington, D. C., November 19, 1956. Sweden deposited its ratification on June 6, 1957; New Zealand on June 21, 1957; and the Union of Soviet Socialist Republics on July 3, 1957; reports the U. S. Department of State. The protocol is not in force yet.

## SECOND INTERNATIONAL FISHERIES TRADE FAIR AT COPENHAGEN

The second International Fisheries Trade Fair was held in Copenhagen, Denmark, from September 27-October 6, 1957. A total of 13 countries presented their products. Fish, fishery products, nets, navigation equipment, echo-sounding equipment, engines, fishing gear, machinery for all purposes in connection with the fisheries trade, etc., are some of the things displayed.

The first International Fisheries Trade Fair, Copenhagen, 1956, was visited by buyers from 33 countries.

For information apply to: The International Fisheries Trade Fair Secretariat, Puggardsgade 10, Copenhagen V, Denmark.

A complete filleting plant incorporating the most up-to-date and modern fish processing machines, packing and weighing tables, and freezers was shown at the fair. The latest production methods, from the raw fish to frozen fillets, were displayed. Machines for herring processing also were shown.



#### EUROPEAN COMMON MARKET

The 18-member Intersessional Committee of the Contracting Parties to the General Agreement on Tariffs and Trade (GATT) met in Geneva beginning April 24. The Committee, of which the United States is a member, discussed the procedures to be followed for the consideration of the European Common Market Treaty by the Contracting Parties.

The Treaty, signed on March 25 in Rome by France, Germany, Italy, Luxembourg, the Netherlands, and Belgium, is now in process of being submitted to parliaments for ratification. It establishes a European common market, which is intended to present a common tariff against goods from outside the area while permitting the free circulation of goods produced within the area.

In addition, quantitative restrictions between members of the common market such as import quotas are to be eliminated. These aims are to be achieved in a transitional period of at least 12 years divided into three stages of four years each.

The general principle is that the common tariff to be adopted by the six states for imports from other countries by the end of the transitional period is to represent a mathematical average of the tariff levels of the six states on January 1, 1957. This rule is qualified by agreement on five lists of products to be excepted from it.

The first cut in tariffs would be made one year after the treaty takes effect and will be a 10-percent reduction applied uniformly to all duties. Another tariff reduction of 10-percent would be made 18 months later, and a third at the end of the fourth year. After the first four-year stage, tariffs must come down by at least 25 percent, and after the second stage 50 percent.

Taxes having the effect of customs duties are to be gradually eliminated during the transitional period, except that France was granted permission to continue her special import taxes.

The overseas territories of the six member states are to be "associated" with the European common market.



#### Australia

**SHRIMP RESOURCES SURVEY TO INCREASE EXPORTS:** In order to increase further Australia's rapidly rising exports of shrimp to the United States, the Department of Primary Industry will undertake a survey of the shrimp grounds off the Northeastern coast of Australia. The survey is expected to locate many beds pres-

ently untouched, thus permitting an expansion of this small but potentially valuable export trade.

In 1955/56, 100,000 pounds of shrimp (prawn) were exported, mainly to the United States. During the first 6½ months of Australia's 1956/57 fiscal year, exports reached 206,000 pounds and were valued at £A60,000 (US\$134,000). At present, however, only a small portion of the probable shrimp grounds are being fished. An officer of the Fisheries Division of the Department of Primary Industry states that shrimp have been found along the eastern coast of Northern New South Wales north and west all the way to Java and that the survey is expected to locate commercially-useful beds throughout the length of the Queensland Coast. The presently known beds (off Northern New South Wales and Southern Queensland) are being heavily fished.

The survey will be undertaken by the Fisheries Division of the Department of Primary Industry and will be financed from the Fisheries Development Trust Fund. This Fund was established from the sale of the assets of the Government Whaling Commission.

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**FISHERY RESOURCE SURVEY OF GREAT AUSTRALIAN BIGHT:** A survey of the fishing prospects in the Great Australian Bight, off the southern Coast of Australia, will be financed from the Fisheries Development Trust Fund. (This Fund was established from the sale of the assets of the Government Whaling Commission.) It is hoped that better supplies of fresh and frozen fish will become available. According to a June 26 announcement by the Minister of Primary Industry, "the Bight represents the only readily accessible major source of fish suitable for the fresh fish market which has not been exploited."

During 1955/56 Australian production of fresh fish was 64 million pounds (live weight), valued at £5,400,000 (US\$12.1 million), while imports of fish (frozen, smoked, dried, and salted, but not canned) amounted to 53 million pounds, valued at £A2,200,000 (US\$4.9 million).

The Government's decision has already received editorial support in the South Australian press, and market conditions there indicate that even a large increase in supplies could be readily sold.



## Bahama Islands

**SPINY LOBSTER INDUSTRY:** Spiny lobsters or crawfish continued as one of the Colony's leading exports. During the season which opened on October 1, 1956, and closed on March 15, 1957, approximately 1,263,325 spiny lobsters weighing 2,100,000 pounds were captured, an increase of 170,303 spiny lobsters over 1955. The value of spiny lobster exports reached £172,957 (US\$484,000) in comparison with £160,647 (US\$450,000) in 1955.

Exports of finfish were minor.

**SPONGE INDUSTRY:** Sponge beds, with the exception of the Rights of Andros, were opened on January 1, 1956, for three months' fishing, and the sponge market opened April 16 and closed May 11. Sizes ran large, quantity exceeded expectations, and the quality was excellent. The total value of sponges sold was £27,234 (US\$76,000). The production consisted of wool, grass, hardhead, and reef.

The sponge beds were opened again in 1957 from April 17 to June 16, and the total value of sponges sold was £29,939 (US\$84,000). Prices were about the same as the previous year.

A survey will be made this coming fall to determine whether the sponge beds can be opened again next year. (U. S. consular dispatch from Nassau, July 15, 1957.)

NOTE: VALUES CONVERTED AT THE RATE OF £1 EQUALS US\$2.80.



### Canada

**LOBSTER AND OYSTER CULTURE AT PRINCE RUPERT, B. C.:** Successful experiments transplanting Eastern lobsters (*Homarus americanus*) and cultivating Pacific oysters (*Crassostrea gigas*) have been carried on since 1954 near Prince Rupert, British Columbia, Canada. The development of these new commercial fishery enterprises in the northern waters of British Columbia may be applicable to the inside coastal waters of Southeastern Alaska.



FIG. 1 - AERIAL VIEW OF THE PRINCE RUPERT LOBSTER AND OYSTER FARM.

During the past decade several attempts have been made to transplant the common or Northern lobster from Canada's Atlantic coast (Nova Scotia) to the Pacific coast. These experiments which began in 1945 were conducted at Nanaimo, Ladysmith, and Vancouver, B. C. The projects were abandoned by 1954. However a retired Canadian Naval officer was convinced that lobsters could be transplanted successfully into Western waters. In 1954 he obtained a permit from the Dominion Government for transplanting Northern lobsters from the Atlantic coast, and he organized a company to do this at Prince Rupert.

This firm selected a well situated cove located on the Tsimpsean Peninsula across the harbor from Prince Rupert and obtained a deed which gave it full possession to the tidelands of the cove (figure 1). Live pens for keeping the small lobsters were constructed. Log rafts were used to support the pens in the water (figure 2). The rafts were also ideal for attaching the "strings" of seed oysters.



The first order from Nova Scotia consisted of 70 small lobsters. Upon arrival 69 were dead. Although this experience was discouraging, another test shipment was made using a new type of container designed to be shockproof and heatproof. This container proved to be the answer for keeping the lobsters alive and in prime condition for the long journey across the country from Nova Scotia to Prince Rupert.

To keep the lobsters in pens, heavy-gauge, fine mesh, stainless steel screens were used to line the pens. After 52 days, the lobsters were released and immediately they went to the bottom of the cove. Some of the small lobsters found homes within the cove while others migrated to the outside coastal waters.

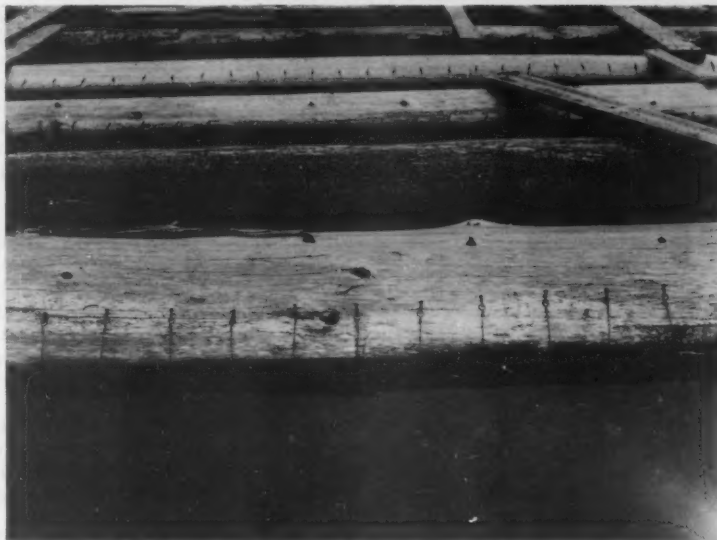


FIG. 2 - LOG RAFTS. NOTE WIRES ATTACHED TO LOG IN FOREGROUND, OYSTERS ARE ATTACHED TO THESE WIRES.

According to the company, the mortality rate is very high while the baby lobsters are going through the free surface-swimming period, and for this reason it

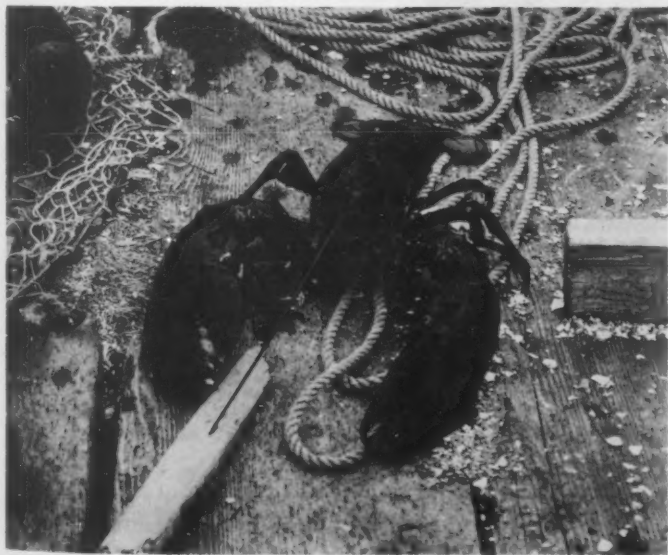


FIG. 3 - IN TWO YEARS, THIS LOBSTER HAS DOUBLED ITS SIZE IN A PEN.

is impractical to make an estimate of how many lobsters have migrated to the coastal areas or how many remained in the cove. It is known that four lobsters released two years ago have been captured in the outside waters.

Three of these lobsters were taken incidental to other types of fishing. When they were caught, the fishermen released them without making any measurements as to size or weight. The last of the four lobsters was taken in a Dungeness crab pot by a fisherman who reported his catch to the Royal Canadian Mounted Police at Prince Rupert. This lobster apparently had traveled

only about 20 miles from the place of its release in the two years of liberation. It was taken on a bottom known to be suitable for lobsters.

When kept in live pens, the lobsters that have been pegged will go through two moulting stages. New shipments of young lobsters must be made to keep the supply of newly-hatched lobsters coming.

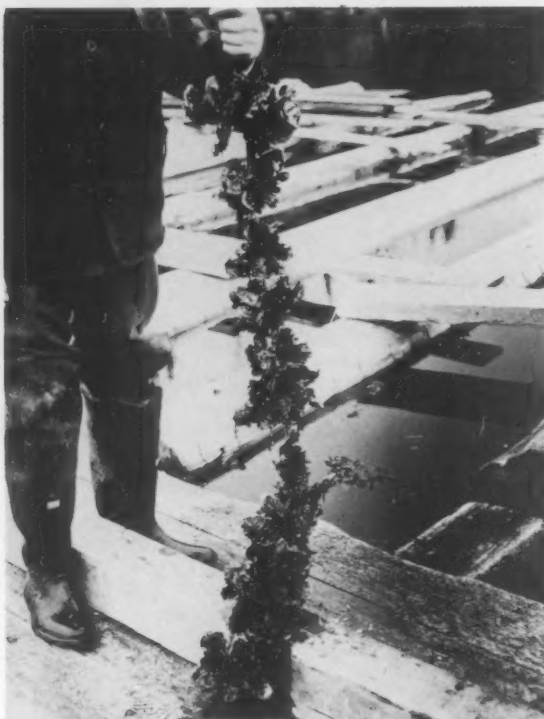


FIG. 4 - OYSTERS BEING GROWN BY THE HANGING METHOD.

removed from the wires, broken loose from the clusters, and scattered on the beaches at low-water mark for fattening. The time required for fattening depends on water conditions, such as amount and kind of plankton, and temperature. It is estimated that it will take six years to produce a large-size marketable oyster. The marketing of these oysters is expected to begin at Prince Rupert within the next two years.

The lobsters maintained for spawning must be fed. Fish is often put in the pens for food, but crushed mussels are used as the main diet.

Although experimental lobster farming at Prince Rupert is still in the early stages, it can now be said that the Northern lobster of the Atlantic coast can be transplanted successfully to western waters.

In addition to lobster culture, oyster culture also is being carried on. The seed oysters which are attached to wires are purchased in Japan and shipped to British Columbia. The wires are attached to floating logs on rafts. Although the hanging method which is common in Japan is new in British Columbia, it is also being used successfully in Southeastern Alaska by a company at Ketchikan, Alaska.

Oyster spat, strung on soft stainless steel wire, are lowered into the water from the log rafts (fig. 2). This method induces a rapid growth rate. In one year the oysters grow to cocktail size. After the first year the oysters are

--BY FRED HIPKINS, FISHERY MARKETING SPECIALIST,  
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U. S. FISH AND WILDLIFE SERVICE, KETCHIKAN, ALASKA.

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**SUBSIDY ON SALT FOR ATLANTIC COAST SALT-FISH PRODUCERS:** A rebate on the cost of salt to Atlantic Coast producers of salted fish products will be continued, the Canadian Fisheries Minister announced recently.

The Minister pointed out that these fishermen who depend on markets for salted fish products do not have access to the fresh and frozen fish plants and that prices

for their products have remained low in the face of increased costs. The assistance will be paid in the provinces of Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, and Quebec. It applies to all salt used by fishermen except where the product is to be marketed in the United States. The Minister stated that prices were higher for those products which go to the United States and that the government did not wish there to be any suggestion of assisted exports to that country.

NOTE: ALSO SEE COMMERCIAL FISHERIES REVIEW, JULY 1956, P. 75.



### Ecuador

**REGULATIONS FOR PERMITS TO EXPLOIT PACIFIC FISHERIES:** Regulations for permits to exploit the maritime wealth of the Pacific Ocean as issued by the third ordinary meeting of the Permanent Commission of the Conference on the Development of Conservation of the Maritime Wealth of the South Pacific were approved by Executive Decree No. 6216. The Decree was published in Ecuador's Official Register early in the year. Ecuador is a member of the Permanent Commission, states a June 24 United States Embassy dispatch from Quito.



### German Federal Republic

**HERRING SPLITTING AND BONING MACHINE DEVELOPED:** A new type of herring splitting and boning machine has been put into use in a Newhaven, England, plant and has done excellent work in the short period of use. The first unit of its type in this country was made by a firm in West Germany.



HERRING SPLITTING AND BONING MACHINE.

It is compact, very simple in operation, and is streamlined to meet normal factory-type layout. The herring is beheaded by one rotating blade set on the upper end of the machine, and the beheaded fish then slide down a chute into the main handling line. This consists of two continuously rotating belts equipped on their external perimeter with hooks. These hooks seize the fish as it emerges down the chute belly-down and carry it over a vertical pair of blades which split the belly and then carry the split fish over three sets of abrasive stones which clean the fine bones on the lugs and then discard the cleaned, boned, gutted herring down a second chute for later handling.

The machine does a very clean job, and can be regulated for speed and for pressure to suit the type of fish being handled.

While it is early yet to indicate the success of this unit or the rate of handling, the users regard it as a very promising development, especially in view of the simplicity of design and clean work which is turned out.

When not in use the whole unit is protected by a flap cover rather like the bonnet of a car which folds over the operating parts (Fish Trades Gazette, June 29, 1957).



## Japan

ALBACORE TUNA FISHING GOOD AT SHIMIZU EARLY IN JUNE: When the albacore tuna season got into full swing, steady landings of 200 to 400 metric tons a day were being made at Shimizu, Japan, early in June. This year the fish were larger than usual--25 to 32 pounds. The canners and freezers were buying actively, but the price dropped to half that of last year and averaged around \$168 a ton ex-vessel. The boats brought in fares of up to 130-140 tons. Good catches were coming in earlier than in the average year, but dissatisfaction was expressed at the low prices.

According to reports from the fisheries branch of Tokai University at Shimizu, dense schools have come to Japanese coastal waters this year and the fishing improved earlier than usual. Furthermore, large fish were taken comparatively close to the coast, catches were particularly good in the Kinan area and along the Izu Islands chain, where boats of the 80- to 100-ton class fish.

Because it looked as if the price would drop excessively, there was a danger that from the middle of June on the boats would cease to follow the schools of small 16- to 24-pound fish and would go after the larger albacore more to the south, thus losing the schools of smaller fish. Also because of the low price, there was a danger that when the schools of skipjack accompanying basking sharks began to appear in June, most of the Mie Prefecture boats would turn from albacore to skipjack fishing and that consequently the catch from the grounds 500 to 1,000 miles off the coast would decrease.

Since the conditions on the fishing grounds are good, it is necessary to stabilize the price to such a degree that the fishermen will not lose their desire to fish for albacore, points out the Nippon Suisan Shimbun (June 10, 1957), a Japanese periodical. Landings at Shimizu during May 1957 were 1,950 tons, or about 190 tons less than in the same month last year.

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FIRST ALBACORE TUNA LANDINGS AT SHIOGAMA IN MAY: From May 20-29, the Shioagama fish market received landings of 6 seiners, 3 carriers of trap fish, and 1 pole-and-line boat, amounting to 48 tons of skipjack tuna, 80 tons of mackerel, and 20 tons of albacore tuna, a total of 148 tons as the main summer fishing season approached. The first landing of albacore totaled 130 tons. The fish were caught on pole and line 160 miles off Nakaminato. About 2,000 pounds of skipjack were mixed in with the albacore, and it is anticipated that summer skipjack fishing off Kinkazan will be better than usual this year.

The albacore landed were comparatively small, weighing on the average of about 14 pounds. The price was high, ranging from a high of \$207 to a low of \$181 a ton ex-vessel. The greater part was bought up by canners as raw material for canned exports, but some of the fish went to local retailers. The seiners' skipjack brought high prices, better than the albacore, the high being \$288 and the low \$235 a ton, states the Nippon Suisan Shimbun (June 7, 1957), a Japanese periodical.

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NORTH PACIFIC MOTHERSHIP SALMON FISHERY CATCH AS OF JUNE 30, 1957: The Japanese North Pacific mothership salmon fishery as of June 30, 1957, reported a catch of 65,586 metric tons as against the quota of 100,000 tons. Of the total, 60,462 tons were caught in the North Pacific area as against the quota of 87,000 tons and 5,124 tons in the Okhotsk area as against the quota of 13,000 tons. These catch figures were released by the Japanese Fisheries Agency in a recent news release.

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**SEED OYSTERS FIND FAVORABLE MARKET IN UNITED STATES:** Kumamoto Prefecture exported 280 cases of breeding or seed oysters to the United States this spring. The price ranged from \$8.50 to \$9.50 a case. Recently the American Pacific Coast Oyster Breeding Association informed the Kumamoto Prefectural Fishery Experimental Farm that breeding oysters from Kumamoto are proving popular in the United States and opened negotiations for the import of 1,500 cases during the next year, points out a July 3 United States consular dispatch from Fukuoka.



### Republic of Korea

**ENTERS DEEP-SEA FISHING FIELD:** One Korean 220-ton fishing vessel (Jinam-ho) cast off early in July for an area near the Philippine Islands for tuna fishing.

The departure of the Jinam-ho represents Korea's entry into a long-desired program of deep-sea fishing activity. It is looked upon by the Korean Minister of Commerce and Industry as an opportunity for the crew to learn modern fishing techniques. The vessel has been equipped with \$75,000 worth of imported equipment which was financed through the United States aid program. (United States Embassy dispatch dated July 8, 1957.)



### Norway

**FILLET EXPORTERS HAVE DIFFICULTY MEETING QUOTAS:** Frozen fish fillet stocks in Norwegian cold storage warehouses have dwindled to such an extent, due to lack of raw fish supplies as a result of the poor winter cod season, that Norwegian exporters are currently unable to fulfill their export contract obligations to Soviet Russia and Czechoslovakia. Barter deals calling for exports of frozen fillets in return for West German, French, and Italian automobiles have been postponed as a result, the United States Embassy reports in a June 7 dispatch. However, the total fillet exports for 1957 will be better than the results from the winter cod season alone would indicate because of the carry-over of stocks from 1956.

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**FISHING VESSEL EQUIPPED FOR FISH-BLOCK FREEZING:** The M/V Senior of Bergen is the first Norwegian fishing vessel to be equipped with a freezing system to freeze fish blocks. The quick-freezing unit is expected to freeze about 3 metric tons daily of fish that would be otherwise culled out at sea. (News of Norway, May 9, 1957.)

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**TEMPORARY FISH PRICE INCREASE GRANTED:** The Norwegian Ministry of Fisheries announced early in June 1957 that a special fish production premium was to be paid for all fish caught between May 1 and September 30. The amount of the premium has not been established, but the press estimates that it will be about 5 øre a kilogram (about  $\frac{1}{3}$  U. S. cent a pound), subject to negotiations between the fishermen and the Board of the Price Fund for fish. The money is to be taken from that fund, which is about exhausted. Representatives for the fishermen have argued that the Government used tax money to help farmers to overcome the effects of the 1955 drought and that it should do the same for the fishermen who have had poor catches, states a June 7 dispatch from the United States Embassy in Oslo.





## Portugal

**FISHERIES TRENDS FOR 1956:** The Portuguese fishing and fish canning industries had a generally successful year in 1956, despite a slow start caused by small runs of fish in the first half of the year.

The catch of all kinds of fish in 1956 amounted to 246,087 metric tons--exclusive of cod--13 percent greater than 1954 (a record year). Canneries in general profited from the abundant catch and the sustained foreign demand.

Production of canned fish and fish in brine totaled 76,321 metric tons, an increase over 1955 of 33 percent for canned fish and 134 percent for fish packed in brine.

Because of the small size and sometimes inferior quality of many of the sardines caught, canneries were unable to pack qualities normally required by some European markets or the boneless and skinless variety preferred in the United States market. Consequently, a large number of orders remained unfilled.

Exports of fish canned and in brine in 1956 totaled 63,335 metric tons, only slightly less than the 63,894 metric tons in 1955.

In the 1956/57 cod fishing season, the Portuguese fleet consisted of 50 hand-line schooners and 22 trawlers. Total cod catch for the season, according to preliminary figures, was 75,054 metric tons of wet cod, compared with 68,537 metric tons in the 1955/56 season.

Portuguese whalers, operating from the Azores and Madeira landed 704 sperm whales and one finback in 1956. The whaling station in Continental Portugal remained inactive during the year.

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**FISHERIES TRENDS, JANUARY-MARCH 1957: Sardine Fishing:** The Portuguese sardine catch during January-March 1957 of 3,858 metric tons (value US\$680,000) was all caught in the month of January. A closed season on sardine fishing went into effect on January 15 and was scheduled to end April 15.

Sardines purchased by the packing centers during January amounted to 2,607 tons (value US\$513,000) or about 68 percent of the catch. The fresh fish markets in January 1957 took 1,283 tons and only 13 tons were used for salting.

**Other Fishing:** The January-March 1957 landings of fish other than sardines were dominated by 6,610 metric tons (value US\$391,000) of chinchard and 795 tons of mackerel (value US\$89,000). Small quantities of anchovy (21 tons) and bonito (less than one ton) were also landed (*Conservas de Peixe*, May 1957).

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**FISHERIES TRENDS, JANUARY-APRIL 1957: Sardine Fishing:** The new Portuguese sardine season opened on April 16. The total amount of sardines caught the last half of April amounted to 2,775 metric tons (valued at US\$327,061 ex-vessel, or \$118 a ton). In April 1956 only 434 tons of sardines were landed with an ex-vessel value of US\$101,670.

Sardines purchased by the canneries during April amounted to 2,775 tons (valued at US\$94,191 ex-vessel, or \$125 a ton), or 27 percent of the total landings. Only 8 tons were salted, and the balance of 2,014 tons, or 72.5 percent of the total, was purchased by the fresh fish market.

The new sardine season showed a certain marked lack of interest on the part of the canneries because of reports that buying by foreign markets was light.

Other Fishing: The January-April 1957 landings of fish other than sardines consisted of 539 tons of anchovy and 6,887 tons of chinchard. (Conservas de Peixe, June 1957.)

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SARDINE FISHING FLEET OWNERS FAVOR CONTROL OVER SIZE OF FLEET: The Portuguese sardine fishing vessel owners, in their report for 1956, recommend that present restrictions on the expansion of the sardine fishing fleet be maintained; that old boats be withdrawn; and that a fund be formed to compensate owners who withdraw dangerously small and uneconomic boats.

They also recommend that those who wish to replace or modernize their boats should be encouraged to do so, says an economic report on Portugal, issued by the Board of Trade in London.

During 1956, a total of 93,172 metric tons of sardines were caught, an increase of 9,205 tons over 1955. The canners utilized 48,295 tons of the 1956 sardine catch and the balance was consumed as fresh, frozen, or salted sardines (Fishing News, June 7, 1957).



## Spain

BILBAO FISHERIES TRENDS, APRIL-JUNE 1957: Fishing vessel operators in the Bilbao district of Spain were not too disappointed in the anchovy catches this season, which were somewhat irregular, as the fish made an unusually early appearance in March and, after a long spell of sparse hauls, appeared again in great numbers at the end of May. As a whole, the fish were excellent and abundant for both fresh consumption and canning purposes. The wholesale price averaged 5.50 pesetas a kilo (6 U. S. cents a pound).

The sardine season, which normally opens during the month of June, appears to be long overdue. (Sardines still continue to be brought to Bilbao from Mediterranean ports at the rate of several truckloads daily.) Consequently, the fishing fleet is concentrating its efforts on tuna which has made an early appearance this year in the Bay of Biscay. The first catches of tuna by the local fishing fleet operating principally off the coasts of Galicia were made early in June, and they promise good prospects for the season. Prices are reported to be remunerative for the fisherman who averages 15 pesetas a kilo (US\$320 a short ton) for the whole fish. (U. S. consular dispatch from Bilbao, July 16, 1957.)

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VIGO FISHERIES TRENDS, MAY 1957: Fishing: During May landings at Vigo sold over the fish exchange amounted to about 8.1 million pounds, valued at US\$770,274. The May landings decreased in quantity about 12.9 percent as compared with the previous month and were about 3.5 percent below the May 1956 landings. The sardine catch was light and amounted to only 44,000 pounds. The sardine fishery up to the end of May has failed to bear out earlier predictions that the sardines had started to return in volume to Spanish coastal waters after an absence of 10 years.

The principal varieties of fish landed in May 1957 were: small hake 1.5 million pounds, horse mackerel 1.4 million pounds, a species known locally as "gallo" (Lepidorhombus

boscii) 0.5 million pounds, and pomfret or dollarfish 0.4 million pounds.

The average price of fish and shellfish sold on the Vigo fish exchange in May was 9.5 U. S. cents a pound as compared with 8.2 U. S. cents in April and 9.1 U. S. cents in May 1956.

Fish Canning: The fish canneries in the Vigo area purchased about 374,000 pounds of fish during May as compared with about 704,000 pounds in April and 289,000 pounds during May 1956.

The canneries packed cuttlefish (or sepia), octopus, pomfret, horse mackerel, and sardines during the first three weeks of

May 1957 but on a very reduced scale. As the result of the lack of fish suitable for packing, practically all canneries were idle during the last week of May--definitely a poor month for the canneries.

Domestic sales of canned fishery products were slow in May and have been estimated to be about 25 percent under May 1956. Exports of canned fishery products showed an improvement over April as the result of the new exchange rate (42.00 pesetas to US\$1 plus a premium of 3.00 pesetas per dollar). The principal export markets during May 1957 were Finland, Germany, Great Britain, Central and South

American countries, and Mexico. Stocks of canned fishery products in the Vigo area are reported to be low.

Canneries and lithographers are more concerned than ever over the tin plate situation in view of the coming tuna and albacore seasons. Small lots of tin plate continue to arrive for local canneries which have been able to export and thereby obtain 20 percent of the foreign exchange for the payment of approved imports. However, import licenses are not being granted for any large lots of tin plate. It is reported that the Spanish mills are only able to supply from 15 to 20 percent of Spain's tin plate requirements.



## Sweden

**FROZEN FISH INDUSTRY:** The Swedish frozen fish industry is a comparatively new industry. Estimates of the quantity of quick-frozen fish consumed in Sweden vary considerably. In the past some estimates have been as high as 15,000 metric tons yearly but it now appears that during the current year consumption is running at a rate of about 3,000 metric tons. According to the trade, this figure is disappointing in the sense that they had expected a slightly higher increase over the preceding year, but some satisfaction is found in the fact that it is in any event an improvement which is viewed as a good sign.

A Norwegian expert after studying the Swedish market recently stated that in his opinion production in Sweden could very well rise to between 15,000-20,000 metric tons a year in five years, provided, however, that the Swedish industry entered competition whole-heartedly, principally with Iceland.

The local industry has found that frozen cod is the most popular item with haddock gaining ground. Other species that are frozen are Baltic herring, other herring, mackerel, and kingfish. New products are gradually appearing in the market. Recent examples are frozen fish pudding and fish steaks, a June 18 dispatch from the United States Consul in Goteborg reports.

The trade also claims that the appearance of frozen fish on the market has improved the demand for fresh fish, aided by the fishing industry promotional activities. Another point made is that surplus fish is now being used to a far greater extent because of freezing facilities. Exports are said to have been stimulated by the freezing process. Large quantities of cod were frozen this year and several hundred metric tons are said to have been exported.



## Thailand

**THAI-JAPANESE JOINT FISHING BASE PROPOSED:** The Japanese Embassy in Thailand has proposed to the Thai Government the establishment of a fishing base on Terutao Island, off the Southwest coast of Thailand. The plan proposes the construction of a port, supply facilities, refrigeration plant, cannery, and auxiliary facilities at a total estimated cost of about US\$9.5 million. This capital is available in Japan. The Thai Government's contribution would be the use of the uninhabited island, in return for a 50-percent ownership of the venture.

The base would enable Japanese fishing boats to exploit the Indian Ocean, which the Japanese Embassy spokesman said is necessary because of shrinking fishing areas in Northern waters. The base, however, would be available to fishing vessels from any nation. The Thai Government is studying the plan, states a July 5 dispatch from the United States Embassy in Bangkok.



## Union of South Africa

**PILCHARD INDUSTRY RESEARCH EXPANDED:** Expansion of research facilities is part of an accelerated program of fisheries research in African South Atlantic coastal waters from the Cape to Walvis Bay, points out the Union of South Africa Director of Fisheries. Twelve additional research laboratories (costing £15,000 to £18,000 or US\$42,000-50,000) for the Division of Fisheries of the Department of Commerce and Industries are being built and are expected to be finished early next year. The new buildings will be devoted to the biological side of fisheries research and the existing 8 laboratories will then become a physical and chemical oceanographic research section.

South-West Africa was combining with the Union in the program, which because of the importance of the industry was basically concerned with the life history of the pilchard and maasbanker. West coast fishermen receive an annual income of about £2 million (US\$4 million) from these two fish.

"Research has been in progress for seven years, but there is still much to be done if conservation methods are to preserve the industry for the future," the Director said.

"For several years it has been laid down that not more than 250,000 tons of pilchards and maasbankers may be landed in the Union or in South-West Africa. This is purely an arbitrary figure. From prolonged research we hope to be able to predict the annual migration and population of these fish and make our conservation plans accordingly."

The intensified research program will cost more than £175,000 (US\$490,000) in extra capital outlay, to be recouped from a levy on the industry, and at least £25,000 (US\$70,000) extra in recurring annual expenditures, to be met from State funds.



## United Kingdom

**CANNED SALMON IMPORT QUOTAS:** The British Board of Trade announced in June 1957 that further quotas have been arranged for canned salmon imports from North American countries and Soviet Russia for the year ending June 30, 1958 (United States Embassy dispatch dated June 24).

Canned salmon cannot be put on open general license for balance of payment reasons, the British Minister of State Board of Trade told the House of Commons. A member of the House asked if there would now be an opportunity for people not previously granted an import quota but importers of other canned fish to get a salmon quota. The Minister said the basis of quota distribution was that 85 percent of imports go to firms which were first-hand distributors for the Government in the period of control, and the remaining 15 percent to postwar importers of canned fish other than salmon.

The United Kingdom's import quota for canned salmon from North America for the year ending June 30, 1958, has been set at £3.5 million c.i.f. (US\$9.8 million) as compared with £3.3 million (US\$9.2 million) for the previous 12-month period. The present quota for Soviet canned salmon is £1.1 million (US\$3.1 million), the same as last year. There exists also a quota of £4.89 million (US\$13.7 million) for imports from Japan, which runs out September 30, 1957.

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**RUSSIA NOT INTERESTED IN IMPORTS OF BRITISH FROZEN WHITE FISH FILLETS:** Soviet Authorities have rebuffed an attempt by the British fishing industry to secure an outlet for its large surplus of fish through exports to Russia. They have replied to the offer by the industry's export organization, Britfish, Ltd., of frozen white fish fillets that they are not interested but might be prepared to import herring if the price was acceptable.

For the past two years Britain has been unable to meet the orders placed for herring by Moscow in return for Britain's agreement to import about £1.0 million (US\$2.8 million) worth of canned crab and shellfish from Russia.

The British fishing industry had, before the Russian reply was received, been promised Board of Trade support in securing a Soviet contract as part of the Anglo-Soviet trade agreement, and it is expected that the Board of Trade will make strong representations to Moscow to secure agreement that the shortfall in herring shall be made up with white fish.

The situation is serious, for unless some reasonably profitable outlet can be found, the existing surplus on the British market is likely to become a glut.

British trawlermen are at present landing much more fish than is being eaten. Fish was often scarce in the winter, but since the weather improved the industry has put on a tremendous spurt to make it up to the housewife by landing heavy catches of good quality fish at reasonable prices.

The industry points out that "if we can persuade the housewife to serve fish regularly two days a week--on Tuesday as well as the traditional Friday--we shall have gone a long way towards solving the problem of the summer surplus, but we realize that this will take time.

"We are still hopeful that exports to Russia and other East European countries may ease the situation. Freezing firms have already helped by taking up large quantities for storage in the expectation that the Board of Trade will be able to secure orders."



## Two Roads... Which?

**G**ESTURES made by individual states to pass laws which make inspection of all frozen food plants mandatory are understandably worrying the industry. There exists, quite soundly, a school of thought which doubts that all-inclusive inspection is necessary. That school asserts that mandatory inspection would bring with it a mountain of red tape which could make the life of every frozen food packer a living nightmare.

For that reason, sharp distinctions should be drawn between inspection of specific seafood products as opposed to inspection of all seafood products and voluntary standards as compared to mandatory standards.

Any industry, which packs and sells a very small part of its products in frozen form, will rise or fall by the quality of those products and the demand for them. It cannot put the cart before the horse. It cannot have inspection before a condition exists which warrants the effort.

This does not mean that the sanitary codes should not be observed. It does mean that hands should be kept off products which have not reached their optimum yet.

The reasons for this stand are simple and basic economics. Until a product has perfected the right formula to achieve maximum sales success, it may not be protected by inspection, but it may be killed with restrictions.

Voluntary inspection means a packer may adopt inspection services at his own discretion and need. Under mandatory inspection he cannot avoid it. Where inspection is needed for the good of the industry, voluntary inspection should be tried before any attempt is made to frame mandatory inspection rules.

The fish stick industry is a case in favor of inspection. Here we had a "natural" being destroyed by poor quality and merchandising. The formula for success was known, but there was no way quality packers could follow it and still remain competitively on the market.

Breaded shrimp packers, by and large, want inspection. Business is good, but in some cases it is good in spite of low quality, not because of it. They want inspection as insurance against the day when there is a sufficiency of shrimp on the market and price cutting makes fair competition impossible.

**E**VERYONE knows that there are leading packers in the seafood industry who do not have inspection and yet process products as high in quality as many of those who do. Such packers complain that they are being forced to adopt inspection, even though, from the standpoint of quality, they do not need it. The reason it is being forced on them, they say, is that those who do have inspection are using the label as a selling point.

They further point out, that plants which started with fish stick inspection have broadened inspection to many of their other products.

It narrows down to the following: Would the industry rather have its members drumming up business by clean, open and constructive emphasis on the minimum guarantees of quality which the USDA seal represents, or would it prefer ruinous cutthroat price cutting with its concomitant quality reduction?

While some seafood products are enjoying marvelous expansion, others can't seem to get off the ground. Others have reached a plateau and do not appear to be able to rise above it. If the inspection seal makes it possible for such products to resume their growth, some red tape will be a cheap price, indeed, to pay. If it does not help, what we have today is still voluntary inspection and can always be dropped.

The choice is not the completely blind and unalterable one of mandatory inspection. It is actually a case of clearly discernible paths with alternative branches.

-- "ANNUAL FROZEN SEAFOOD REVIEW" ARTICLE,  
FROM QUICK FROZEN FOODS MAGAZINE.





# FEDERAL ACTIONS

## Department of the Interior

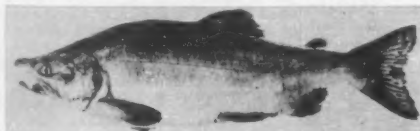
### PACIFIC COAST SALMON FISHERY GIVEN MORE PROTECTION BY NEW LEGISLATION:

Salmon fishing with nets is now prohibited to United States nationals on the high seas throughout the North Pacific Ocean area as the result of legislation approved by the President on July 24 and regulations issued by the Department of the Interior on July 25.



SOCKEYE SALMON  
*ONCORHYNCHUS NERKA*

The revision of the North Pacific Fisheries Act and the Interior Department regulations extend protection of salmon on the high seas off British Columbia. They supplement action taken by Canada and the States of Washington, Oregon, and California.



PINK SALMON  
*ONCORHYNCHUS GORBUSCHA*

To implement the new Federal legislation, Interior Secretary Seaton issued regulations effective July 27 which prohibit any person or fishing vessel subject to the jurisdiction of the United States to fish or take salmon, except by trolling, in the North Pacific Ocean north of 48° 30' north latitude. This does not apply to fishing for sockeye salmon or pink salmon south of latitude 49° north since control of these species is covered from latitude 49° to 48° by the International Sockeye Salmon Commission.

The North Pacific Fisheries Act, as approved on August 12, 1954, authorized the Secretary of the Interior to control fishing by United States nationals on the high seas of the North Pacific Ocean but restricted the authority to the water contiguous to the waters of Alaska.

In 1956, after salmon net fishing on the high seas off the State of Washington met with considerable success, concern for the future of the fishery was expressed by the salmon industry on the Pacific Coast. As a result of meetings held with representatives of the three Pacific Coast States and Canada, laws were passed by the three States to prohibit net fishing for salmon on the high seas. Canada, by order in council, also prohibited such fishing by its nationals.

The revision of the North Pacific Fisheries Act now extends the jurisdiction of the Secretary of the Interior southward to latitude 48 degrees 30 minutes north. This closes the gap between the southern boundary of Alaska and the State of Washington with respect to United States nationals.

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### CHANGES IN BASIC FISHERY ACT OF ALASKA RECOMMENDED:

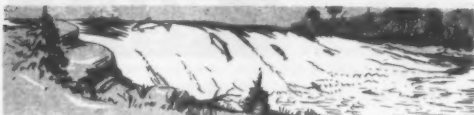
The management of the salmon fisheries of Alaska would be strengthened by the enactment of legislation proposed by the Department of the Interior, Assistant Secretary of the Interior Ross L. Leffler said June 17.

The new bill contains minor amendments to the White Act of June 6, 1934, the basic fishery law for the conservation of the commercial fisheries of Alaska.

Of the four items recommended for change, two would give the Fish and Wildlife Service of the Department of the Interior greater flexibility of control in managing the salmon resource in the Territory, one would increase restrictions to prevent unwarranted damage to the fishery, and the fourth would facilitate the enforcement of the laws and regulations.

The White Act stipulates that in all waters of Alaska in which salmon run "there shall be an escapement of not less than 50

percent thereof." The Service has found this provision to be extremely inflexible. If the runs are large, a 50-percent escapement can be excessive and wasteful; in some cases when the runs are small, the 50-percent escapement can be wholly inadequate. With the repeal of this provision, Service officials could determine adequate escapements based upon biological needs.



The provision requiring a 36-hour closed period extending from 6 p.m. Saturday to 6 a.m. Monday has also been found to be too inflexible. If revised, the exact time each week when

the 36-hour closure would be effective would be left to regulation by the Service.

The third change would provide a penalty for the possession and disposal of commercial fish taken in violation of the law, and would apply to both seller and buyer. This penalty would be a fine of "not to exceed \$5,000 or imprisonment for a term of not more than 90 days in jail, or by both such fine and imprisonment."

The fourth change recommended would prohibit fishing inside the mouths of salmon streams by means of hand rod, spear, or gaff for commercial purposes. This limitation would not apply to the Karluk, Ugashik, Yukon, and Kuskokwin Rivers. While of no consequence in 1924 when the price paid for fish was low, these methods frequently are employed today with serious damage to the runs in particular streams adjacent to fast-growing centers of population.

\* \* \* \* \*

### THE SECRETARY MAKES CERTAIN DELEGATIONS OF AUTHORITY CONCERNING FISHERIES:

Because of the change in status of the Fish and Wildlife Service implemented by the Fish and Wildlife Act of 1956, the

Secretary of the Interior has made certain changes regarding delegations of authority concerning fisheries. The changes appeared in the July 19 Federal Register and are as follows:

### DEPARTMENT OF THE INTERIOR

#### Office of the Secretary

[Order 2509, Amdt. 25]

#### HEADS OF BUREAUS

#### DELEGATIONS OF AUTHORITY, GENERAL

JULY 11, 1957.

1. Order No. 2509, as amended, is further amended as hereinafter indicated:

Paragraph (g) of section 50 *Contracts; Burcaus* (17 F. R. 6793, 8634; 19 F. R. 433, 7417) is amended to read as follows:

(g) As used in this section, the term "bureau" means The Alaska Railroad, the Bureau of Indian Affairs, the Bureau of Land Management, the Bureau of Mines, the Bureau of Reclamation, the United States Fish and Wildlife Service, the Geological Survey, the National Park Service, the Office of Territories, the Southeastern Power Administration and the Southwestern Power Administration.

Section 52 *Leases* (17 F. R. 6793; 19 F. R. 433) is amended to read as follows:

Sec. 52. *Leases.* (a) The head of a bureau and the Solicitor may exercise the authority vested in the Secretary pursuant to Regulations of the General Services Administration, Title 2, Real Property Management, to perform all functions with respect to acquisition by lease of space in buildings and land incidental to the use thereof when:

(1) The space is found by the Administration to be special purpose in character under section 1 (d) of Reorganization Plan 18 of 1950.

(2) The space is required for use incidental to, in conjunction with, and in close proximity to, space which has been found by the Administration to be special purpose.

(3) The space is leased for no rental, or for a nominal consideration of \$1.00 per annum.

(4) The space is located in Puerto Rico, the Virgin Islands, or the Territories of Alaska and Hawaii.

(5) The agency has been specifically authorized by the Administration to perform any or all such functions.

(b) The head of a bureau and the Solicitor may, in writing, redelegate or authorize written redelegation of the authority granted in this section. Each redelegation shall be published in the FEDERAL REGISTER.

(c) The authority granted under this section shall be exercised in compliance with applicable regulations and statutory requirements and shall be subject to the availability of appropriations.

(d) As used in this section, the term "bureau" means The Alaska Railroad, the Bonneville Power Administration, the Bureau of Indian Affairs, the Bureau of Land Management, the Bureau of Mines, the Bureau of Reclamation, the United States Fish and Wildlife Service, the Geological Survey, the National Park Service, the Office of Territories, the Southeastern Power Administration, and the Southwestern Power Administration.

2. Authority with respect to contracts for construction, supplies, or services and authority with respect to the lease of space which was previously vested in the Director of the former Fish and Wildlife Service and which was included in the authority delegated severally on November 3, 1956 (21 F. R. 8513) to the Director, Bureau of Commercial Fisheries, and the Director, Bureau of Sport Fisheries and Wildlife, may be exercised by such officers until 90 days from the date of this amendment to Order No. 2509 unless sooner revoked or superseded

by or pursuant to an action of the Commissioner of Fish and Wildlife. Any authority with respect to contracts for construction, supplies, or services and any authority with respect to the lease of space which was continued in force pursuant to the document issued by the Secretary of the Interior on November 3, 1956 (21 F. R. 8513), empowering other officers and employees of the United States Fish and Wildlife Service to exercise certain authority, is continued in force until 90 days from the date of this amendment to Order No. 2509 unless sooner revoked or superseded by or pursuant to an action of the Commissioner of Fish and Wildlife.

FRED A. SEATON,  
Secretary of the Interior.

[Order 2821]

#### COMMISSIONER AND EMPLOYEES OF UNITED STATES FISH AND WILDLIFE SERVICE

#### DELEGATIONS OF AUTHORITY WITH RESPECT TO CERTAIN DUTIES AND FUNCTIONS

JULY 11, 1957.

SECTION 1. *Commissioner of Fish and Wildlife.* (a) The Commissioner of Fish and Wildlife may exercise all of the authority of the Secretary of the Interior with respect to any matter relating to fish and wildlife, except

(1) The signing of correspondence addressed to the President;

(2) The exercise of powers delegated by the President to the Secretary without any authorization for redelegation;

(3) The issuance of regulatory documents, which are subject to codification in the Code of Federal Regulations (44 U. S. C., 305; 1 CFR 1.10), and which do

not fall within the provisions of paragraph (b) of this section;

(4) The making of apportionments of funds in connection with Federal aid in fish or wildlife restoration;

(5) The appointment or removal of Commissioners as provided in the Alaska Game Law of January 13, 1925, as amended (43 Stat. 739; 48 U. S. C. 208);

(6) The taking of actions required by sections 3 and 4 of the Whaling Treaty Act of August 9, 1950 (64 Stat. 421, 422; 16 U. S. C. 916a, 916b) to be taken by the Secretary of the Interior;

(7) The appointment of the advisory committee of the American fisheries industry, provided for in section 2 (c) of the act of July 1, 1954 (68 Stat. 376; 15 U. S. C. 713c-3 (c));

(8) The exercise of the authority contained in the act of June 25, 1934 (48 Stat. 1213; 15 U. S. C. 522) relating to monopolization and restraint of trade by associations of persons engaged in the fishery industry;

(9) The submission of reports to the President or the Congress;

(10) The designation of a representative of the Department referred to in section 8 (a) of the Fish and Wildlife Act of 1956 (70 Stat. 1119);

(11) The submission of reports to the United States Tariff Commission under section 9 (b) of the Fish and Wildlife Act of 1956 supra;

(12) The approval of fisheries loan authorizations in excess of \$50,000.

(b) The authority granted in paragraph (a) of this section includes authority to take any action which, as provided in Title 50 of the Code of Federal Regulations, may be taken by an authorized representative of the Secretary of the Interior or an officer or employee of the United States Fish and Wildlife Service, such as the issuance of orders or regulations which

(1) Extend or reopen, pursuant to Part 6, Title 50, Code of Federal Regulations, the hunting seasons on migratory game birds to compensate for emergency closures to prevent forest fires;

(2) Prescribe a temporary closure of the open seasons on any species of big game animals, pursuant to Part 46, Code of Federal Regulations, in any area in Alaska where necessary;

(3) Prescribe, pursuant to Subchapter C, Title 50 Code of Federal Regulations, the terms and conditions to govern hunting, fishing, trapping, and recreational activities on wildlife conservation areas;

(4) Pursuant to Part 102, Title 50, Code of Federal Regulations, shorten, lengthen, or reopen for limited periods, and impose further restrictions on the means, methods and areas of fishing and on the catch of fish otherwise permitted to be taken for commercial purposes in Alaska.

(c) The authority granted in paragraph (a) of this section shall not be construed as including authority in any matter covered by a delegation from the Secretary of the Interior to the Commissioners of Fish and Wildlife, expressly, or as the head of a bureau, such as authority with respect to defense functions relating to fishery commodities or products, authority with respect to personnel management, authority to designate certifying officers, etc. Authority in such

matters is delegated to the Commissioner by other documents.

(d) The Commissioner of Fish and Wildlife may, in writing, redelegate or authorize written redelegation of the authority granted in paragraph (a) of this section, except that authority to approve fisheries loan authorizations may be re-delegated only to the Director, Bureau of Commercial Fisheries.

SEC. 2. *Other officers or employees of the Service.* Each officer or employee of the United States Fish and Wildlife Service is empowered to continue to exercise authority vested in such person or position by the document issued by the Secretary of the Interior on November 3, 1956 (21 F. R. 8513) for 90 days from the date of this order, unless such authority is sooner revoked or superseded by or pursuant to an action of the Commissioner of Fish and Wildlife.

SEC. 3. *Revocation.* The following orders and amendments thereof are revoked, but this action shall not be construed as affecting the provisions of section 2 of this order.

1798, 2340, 2400, 2532, 2570, 2584, 2711, 2617 (21 F. R. 8032).

FRED A. SEATON,  
Secretary of the Interior.

[Order 2622]

#### DEFENSE FUNCTIONS

##### DELEGATIONS OF AUTHORITY

JULY 11, 1957.

SECTION 1. *Delegation of authority.* Except as provided in section 3 of this order and in redelegations, which the Secretary may make or has continued, to agencies outside of the Department of the Interior, all functions and powers which are or may be vested in the Secretary of the Interior by delegations or redelegations issued pursuant to the Defense Production Act of 1950, as amended, or issued pursuant to any other law by virtue of authority delegated to him under the Defense Production Act of 1950, as amended, may be performed and exercised:

(a) In so far as these functions and powers relate to domestic exploration for metals and minerals, by the Administrator of the Defense Minerals Exploration Administration;

(b) In so far as these functions and powers relate to solid fuels and the distribution of petroleum coke, and to metals and minerals, other than domestic exploration for metals and minerals, by the Director of the Office of Minerals Mobilization;

(c) In so far as these functions and powers relate to fishery commodities or products, by the Commissioner of Fish and Wildlife; and

(d) In so far as these functions and powers relate to petroleum or gas, other than the distribution of petroleum coke, by the Director of the Office of Oil and Gas.

SEC. 2. *Electric power.* The defense functions of the Secretary relating to electric power fall within the assignment of the Assistant Secretary—Water and Power Development, who is one of the Secretarial officers already empowered by section 1 of Order No. 2509, as

amended (17 F. R. 6793, 8634; 22 F. R. 2218) to exercise the authority of the Secretary with respect to various matters relating to defense, including electric power.

SEC. 3. *Limitations.* (a) Section 1 of this order does not authorize any officer mentioned in that section to:

(1) Perform any function or exercise any power which cannot be redelegated by the Secretary of the Interior under the provisions of any delegation of authority to the Secretary;

(2) Redelegate any power or function to any person other than an officer or employee of the bureau or office which he heads;

(3) Appoint or employ any person under section 710 of the Defense Production Act of 1950, as amended; or

(4) Issue orders or directives relating to petroleum, gas, or solid fuels.

(b) Existing arrangements for Department representation on interagency and interdepartmental committees and boards dealing with defense functions are hereby confirmed, but the function of specifying the arrangements for such representation as may be necessary is reserved to the Secretary.

(c) The function of establishing policies pertaining to defense matters involving two or more defense areas is reserved to the Secretary.

SEC. 4. *Access roads.* (a) The Director of the Office of Minerals Mobilization is directed to exercise the function of certifying access roads in connection with the production of metallurgical coal to the Secretary of Commerce under section 6 of the Defense Highway Act of 1941, as amended (23 U. S. C., sec. 106) and section 12 of the Federal-Aid Highway Act of 1950 (84 Stat. 791), pursuant to the Presidential memorandum of March 3, 1952.

(b) The Administrator of the Defense Minerals Exploration Administration is similarly directed to exercise the function of certifying access roads in connection with the exploration for strategic and critical metals and minerals and related development.

SEC. 5. *Effect on prior actions.* (a) Interior Defense Delegation 1 (19 F. R. 9357) to the Administrator of General Services respecting metals and minerals is continued in force. Defense Solid Fuels Administration Delegation 1 (16 F. R. 4590) to the Secretary of Commerce respecting the distribution of coal chemicals produced as byproducts of coke made from coal is continued in force. Petroleum Administration for Defense Delegation 1 (16 F. R. 3389) to the Business and Defense Services Administration (N. P. A.), Department of Commerce, respecting certain products of petroleum and gas origin is continued in force. Defense Minerals Exploration Administration Order 1, as amended, and redelegations made by the Administrator of the Defense Minerals Exploration Administration are continued in force. This order shall not be deemed to affect the Voluntary Agreement Relating to Foreign Petroleum Supply, dated May 1, 1953 (18 F. R. 4262), as amended April 15, 1954 (19 F. R. 2278).

(b) This order supersedes Order No. 2781 (20 F. R. 316). (Defense Production Act of 1950, as amended (50 U. S. C. App.,

sec. 2153); Sec. 168 of the Internal Revenue Code; E. O. 10480, as amended (18 F. R. 4939, 6201, 19 F. R. 7249); Defense Mobilization Order I-7, as amended (18 F. R. 5366, 19 F. R. 7348); Defense Mobilization Order I-13 (19 F. R. 7348); Defense Mobilization Order VII-5, as amended (18 F. R. 6408, 19 F. R. 7349);

Defense Transport Administration Delegation No. 6, as amended, and continued by Organization Order DTA 1, as amended (16 F. R. 4149, 19 F. R. 1071, 20 F. R. 4550); NPA Delegation No. 9, continued by Business and Defense Services Administration Regulation No. 1 (17 F. R. 1908, 18 F. R. 6337); Department of Ag-

riculture, Defense Food Delegation No. 2, Revision 1 (17 F. R. 2369); Federal Civil Defense Administration Delegation 3 (20 F. R. 5957); Federal Civil Defense Administration Delegation 4 (20 F. R. 8733)

FRED A. SEATON,  
Secretary of the Interior.



## Department of State

### TERRITORIAL WATERS AND LAW OF THE SEA TOUCHED UPON IN AN ADDRESS BY UNDER SECRETARY OF STATE:

Territorial waters and law of the sea, subjects of considerable concern to United States fishery interests, were touched upon in an address by Under Secretary of State Christian A. Herter. The address was delivered at the annual dinner of the American Bar Association at New York City on July 15, 1957. The parts of the address referring to these subjects follow:

"... The law can be made in different ways. The law of the sea has in a measure been strengthened through the experience and action of governments and international organizations in dealing with the Suez Crisis and its aftermath. It may be further developed if at some future date the question of right of transit through the Suez Canal and the Gulf of Aqaba should become the subject of consideration by the International Court of Justice.

"The law of the sea will be still further strengthened and clarified, I feel sure, by the efforts of the United Nations Conference on Law of the Sea to be held in Europe next year. In this case there will be deliberate and direct efforts to codify and write law by representatives of the various members of the United Nations and specialized agencies.

"I might recall in passing that the United States has a particular interest in the question of the breadth of the territorial sea, which will be considered at the Conference. We hold that international law does not require states to recognize a breadth of territorial sea beyond three miles, for it is our belief that the freedom of the seas, in its widest implications, is the principle fairest to all nations, large and small. . . ."

## White House

### U. S. COMMISSIONER APPOINTED FOR INTER-AMERICAN TROPICAL TUNA COMMISSION:

Arnie J. Suomela, Commissioner of the Fish and Wildlife Service, U. S. Department of the Interior, was appointed by the President as a United States Commissioner on the Inter-American Tropical Tuna Commission, May 10, 1957. Suomela took his oath of office on May 14, 1957.



## Eighty-Fifth Congress (First Session)

Public bills and resolutions which directly or indirectly affect the fisheries and allied industries are reported upon.

Introduction, referral to committees, pertinent legislative actions, hearings, and other chamber actions by the House and the Senate, as well as signature into law or other final disposition, are covered.



**ALASKA STATEHOOD:** The Senate Committee on Interior and Insular Affairs in executive session on July 30 ordered favorably reported with amendments S. 49, providing statehood for Alaska.

**ALASKA TIDAL WATERS:** H. R. 6760, a bill to grant to the Territory of Alaska title to certain lands beneath tidal waters (excluding title to fisheries resources) and for other purposes; with amendment--was reported to the House by the Committee on Interior and Insular Affairs on July 31 (H. Rept. No. 950). Referred to the Committee of the Whole House on the State of the Union. Similar to S. 2536 introduced July 12.

**House Report No. 950,** Granting to the Territory of Alaska Title to Certain Lands Beneath Tidal Waters (July 31, 1957, 85th Congress 1st Ses-



sion) to accompany H. R. 6760, 5 pp., printed. This report explains the proposed legislation.

**COMMERCIAL PRODUCTION OF FISH ON RICE LANDS:** Senate Committee on Interstate and Foreign Commerce ordered favorably reported (S. Rept. 780) on July 25 with amendment S. 1552 to establish a program of research for development of commercial production of fish on flooded rice acreage.

Senate Report No. 780, Fish Farming (August 1, 1957, 85th Congress, 1st Session) to accompany S. 1552, 9 pp., printed. The purpose of the bill, cost estimates, committee action, and departmental reports are presented.

Senate on August 5 passed with amendment and cleared for the House S. 1552.

**FISHING VESSEL RIGHTS ON THE HIGH SEAS:** Senate Committee on Interstate and Foreign Commerce ordered favorably reported on July 25 with amendment S. 1483, relating to the rights of vessels of U. S. on the high seas and in territorial waters of foreign countries. As reported by the Committee, the bill would make it mandatory for the Secretary of State to take action and also require him to report annually to Congress on the status of such claims.

**FUR-SEAL CONVENTION:** Executive V, 85th Congress, 1st session, was reported on July 29 by the Senate Committee on Foreign Relations--an interim Convention on Conservation of North Pacific Fur Seals, signed at Washington on February 9, 1957, in behalf of Canada, Japan, U.S.S.R., and U. S.; without reservation (Ex. Rept. No. 10).

Executive Rept. No. 10, Interim Convention on Conservation of North Pacific Fur Seals (July 29, 1957, 85th Congress, 1st Session) to accompany Executive J, 85th Congress, First Session, 6 pp., printed. The Committee on Foreign Relations, after having considered Executive J, recommended that the Senate ratify it. The report explains the purpose and background of the convention, and summarizes the provisions. It also indicates the implementing legislation required, the estimated cost to the United States (\$10,000 a year), and the committee action and recommendation.

**HAWAII STATEHOOD:** The Senate Committee on Interior and Insular Affairs in executive ses-

sion on July 30 ordered favorably reported with amendments S. 50, providing statehood for Hawaii.

**LOAN FUND FOR FISHERIES:** H. R. 9019 (Bates), introduced August 1, a bill to authorize the provision of additional capital for the fisheries loan fund established by the Fish and Wildlife Act of 1956, and for other purposes; to the Committee on Merchant Marine and Fisheries.

**SAFETY OF LIFE AT SEA:** The Senate Committee on Foreign Relations reported on July 26, Executive M, 85th Congress, 1st session--an amendment to the International Convention for the Safety of Life at Sea, together with a proposal for amendment originated with the Government of the United Kingdom and contained in a memorandum, dated at London in May 1955--without reservation (Ex. Rept. No. 9).

**SMALL BUSINESS ACT AMENDMENT:** S. 2504, to extend the Small Business Administration for 1 year and authorize an additional \$75 million for business loans, was passed by the Senate on August 2 with an amendment by Senator Thyne, making the act effective as of close of July 31, 1957.

By a voice vote on August 2 the House passed and cleared for the President S. 2504.

S. 2504, was signed by the President August 3, 1957 (P. L. 85-120).

Senate Report No. 597, Extension of Small Business Administration (July 9, 1957, 85th Congress 1st Session), to accompany S. 2504, 6 pp., printed. This report contains a summary of SBA programs, and discusses committee action, purposes of the bill, and changes in existing law.

**WATER POLLUTION:** H. R. 8932 (Pillion), introduced on July 29, a bill to amend the definition "interstate waters" in the Federal Pollution Control Act to include the Great Lakes, their interconnecting waterways, and the St. Lawrence River; to the Committee on Public Works.

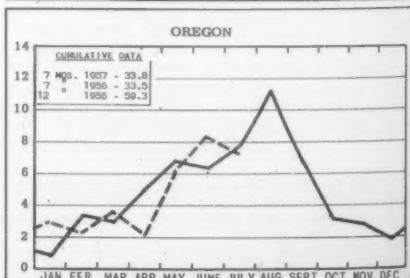
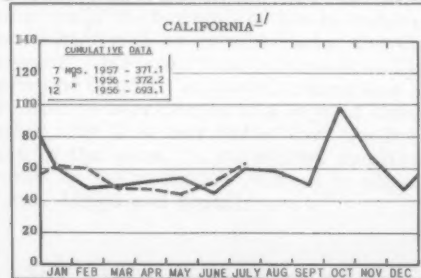
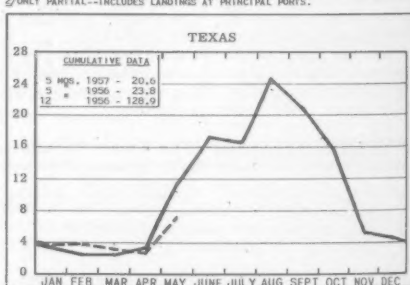
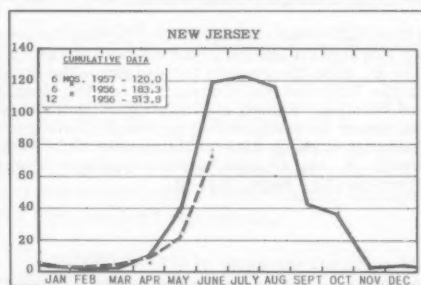
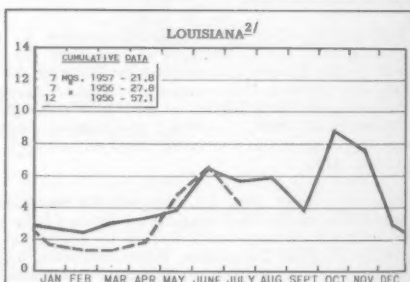
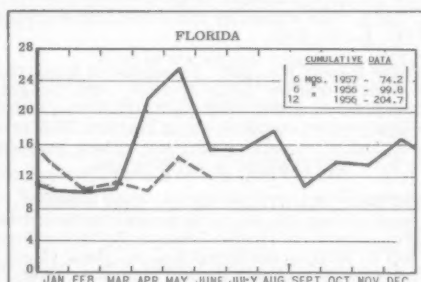
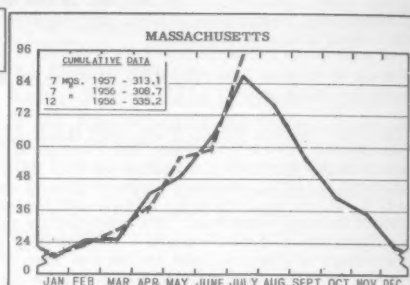
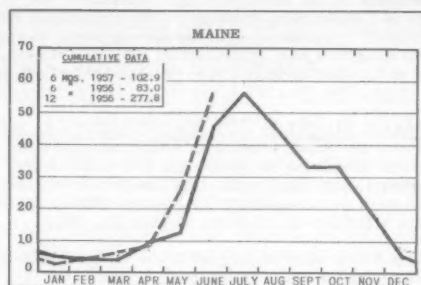
**WHALING CONVENTION:** The Senate Committee on Foreign Relations reported on July 26, Executive E, 85th Congress, 1st session--the Protocol to the International Convention for the Regulation of Whaling, signed at Washington under date of December 2, 1946, which protocol was signed at Washington under date of November 19, 1956, for the U. S. and 16 other governments--without reservation (Ex. Rept. No. 8).





# FISHERY INDICATORS

**CHART 1 - FISHERY LANDINGS for SELECTED STATES**  
In Millions of Pounds

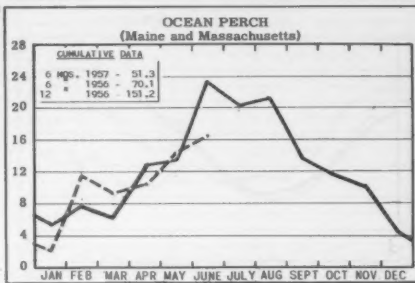
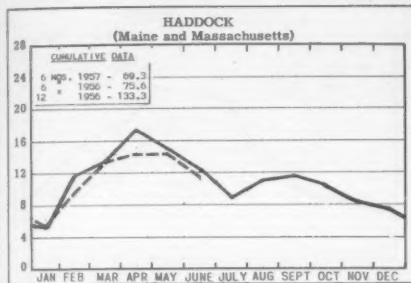


<sup>1/</sup>ONLY PARTIAL--INCLUDING PRODUCTION OF MAJOR FISHERIES AND MARKET FISH LANDINGS AT PRINCIPAL PORTS.

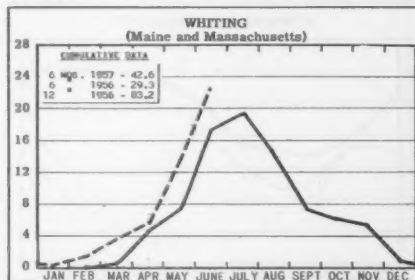
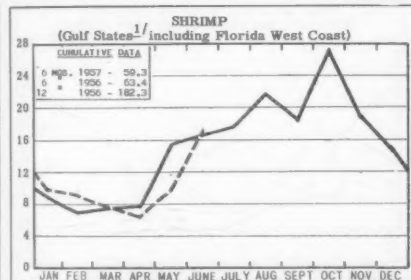
<sup>2/</sup>ONLY PARTIAL--INCLUDES LANDINGS AT PRINCIPAL PORTS.

## CHART 2 - LANDINGS for SELECTED FISHERIES

In Millions of Pounds

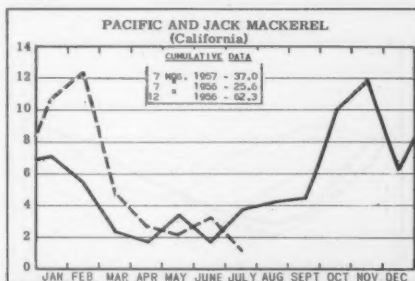
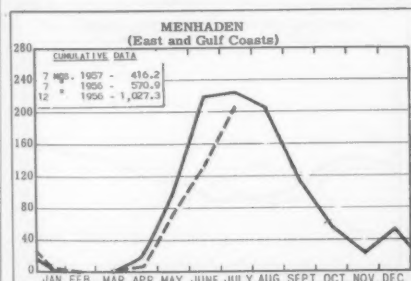


In Millions of Pounds

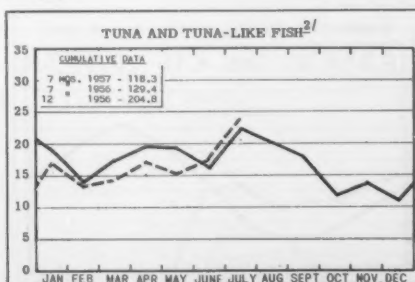
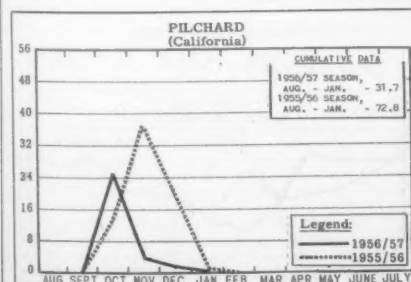


<sup>1/2</sup> ALA. DATA BASED ON LANDINGS AT PRINCIPAL PORTS AND ARE NOT COMPLETE.

In Thousands of Tons



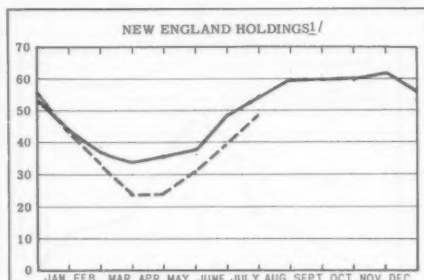
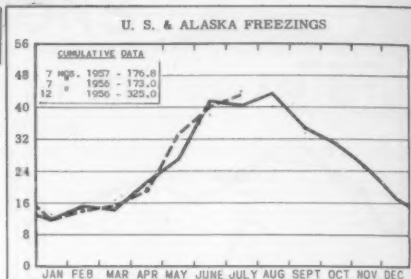
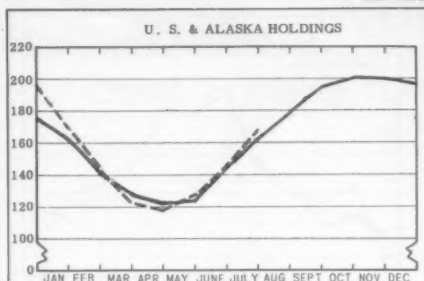
In Thousands of Tons



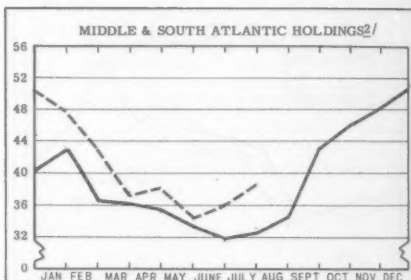
<sup>2/</sup> RECEIPTS BY CALIFORNIA CANNERIES, INCLUDING IMPORTS.

# CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS \*

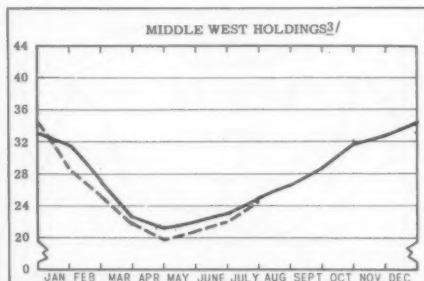
In Millions of Pounds



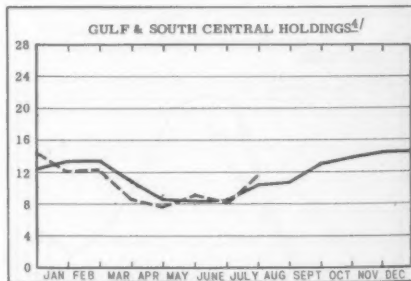
<sup>1/</sup>MAINE, MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.



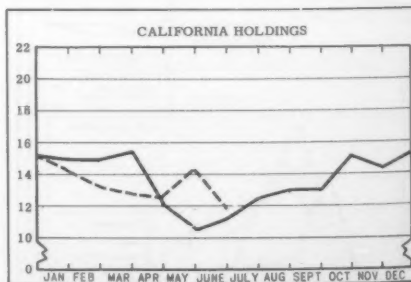
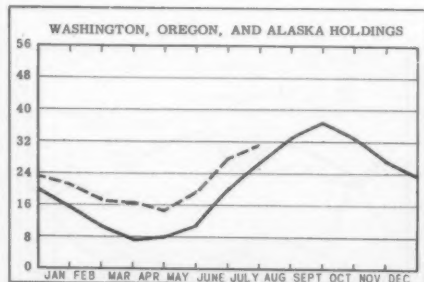
<sup>2/</sup>ALL EAST COAST STATES FROM N.Y. SOUTH.



<sup>3/</sup>OHIO, IND., ILL., MICH., WIS., MINN., IOWA, MO., N. DAK., NEBR. & KANS.



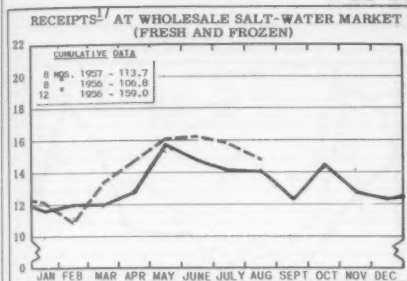
<sup>4/</sup>ALA., MISS., LA., TEX., ARK., KY. & TENN.



\*Excludes salted, cured, and smoked products.

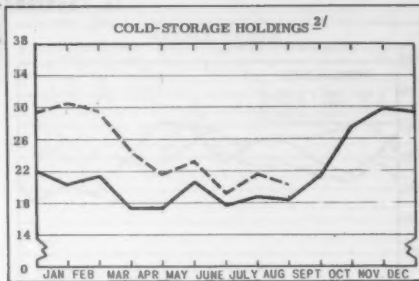
# CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

In Millions of Pounds

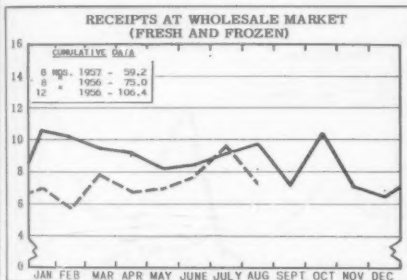


<sup>1/</sup>INCLUDE TRUCK AND RAIL IMPORTS FROM CANADA AND DIRECT VESSEL LANDINGS AT NEW YORK CITY.

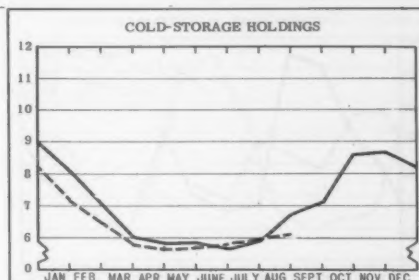
## NEW YORK CITY



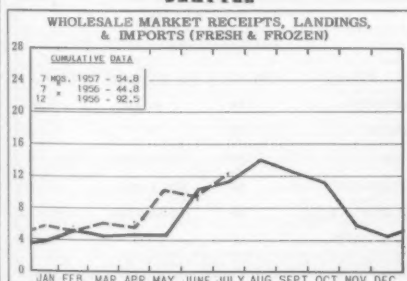
<sup>2/</sup>AS REPORTED BY PLANTS IN METROPOLITAN AREA.



## CHICAGO

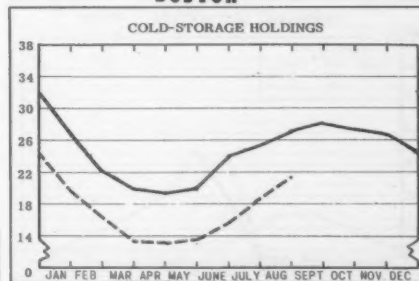


## SEATTLE

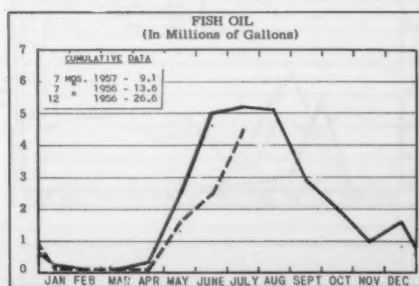
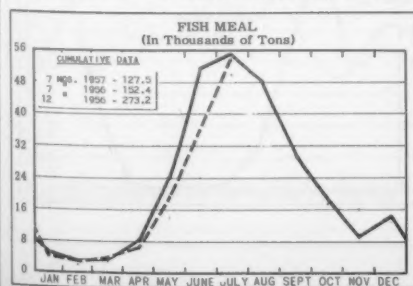


LEGEND:  
— 1957  
- - 1956  
... 1955

## BOSTON

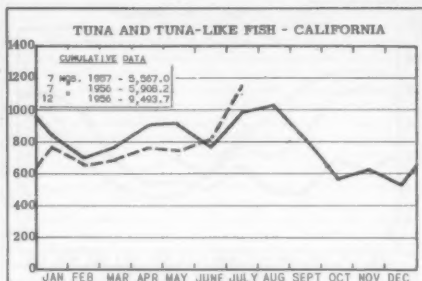


# CHART 5 - FISH MEAL and OIL PRODUCTION - U.S. and ALASKA

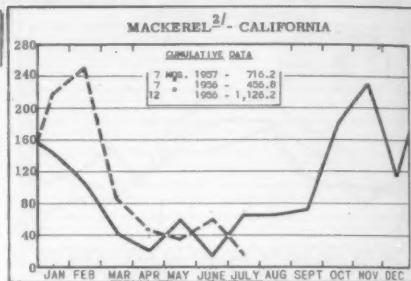


# CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

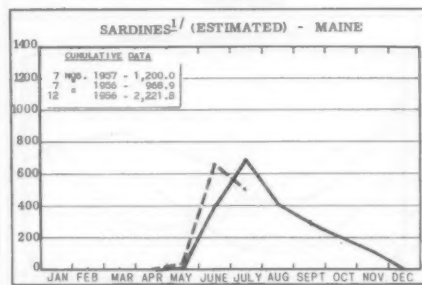
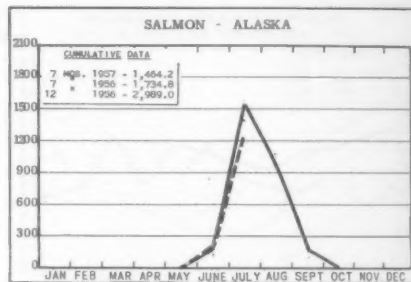
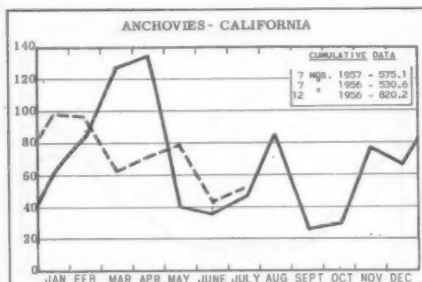
In Thousands of Standard Cases



LEGEND:  
--- 1957  
— 1956  
..... 1955

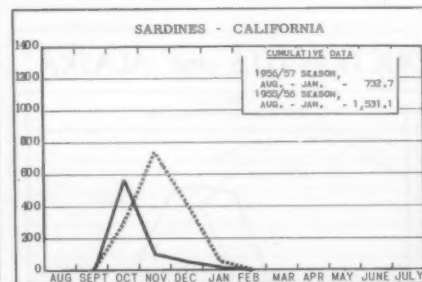


<sup>2/</sup>INCLUDES PACIFIC MACKEREL AND JACK MACKEREL.

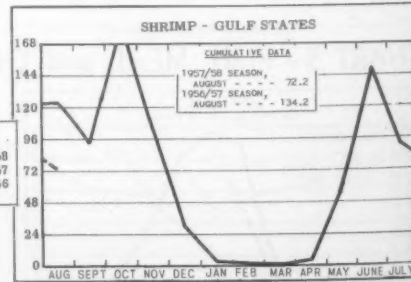


<sup>1/</sup>INCLUDING SEA HERRING.

STANDARD CASES			
Variety	No. Cans	Can Designation	Net Wgt.
SARDINES .....	100	$\frac{1}{4}$ drawn	3 $\frac{1}{2}$ oz.
SHRIMP .....	48	--	5 oz.
TUNA .....	48	No. $\frac{1}{2}$ tuna	6 & 7 oz.
PILCHARDS .....	48	No. 1 oval	15 oz.
SALMON .....	48	1-pound tall	16 oz.
ANCHOVIES .....	48	$\frac{1}{2}$ lb.	8 oz.



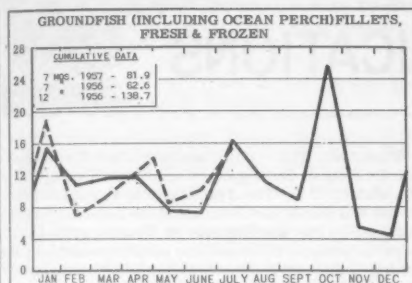
Legend:  
--- 1957/58  
— 1956/57  
..... 1955/56





## CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

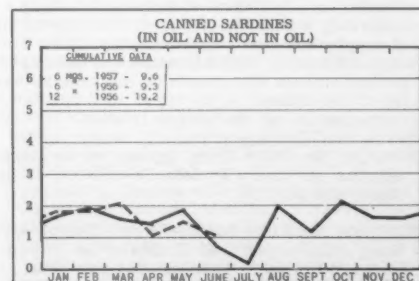
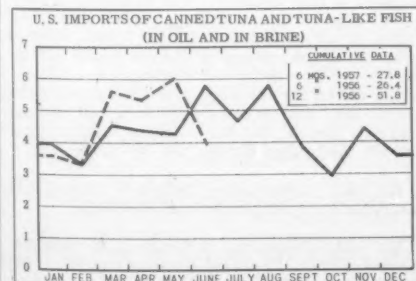
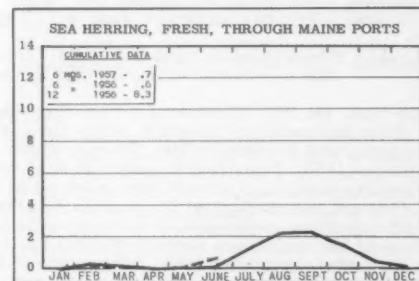
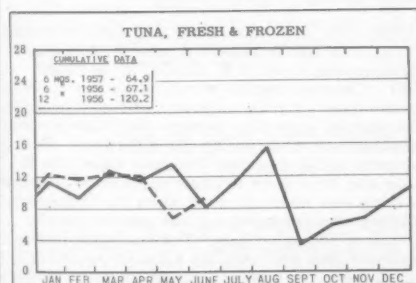
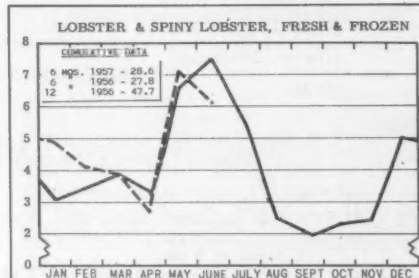
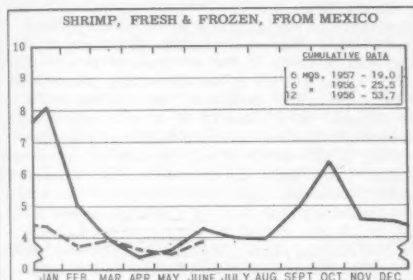
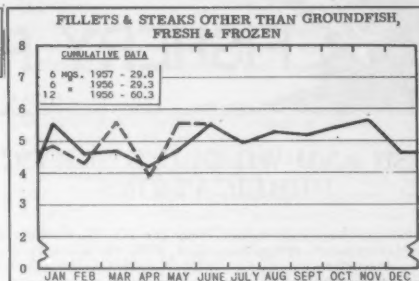
In Millions of Pounds

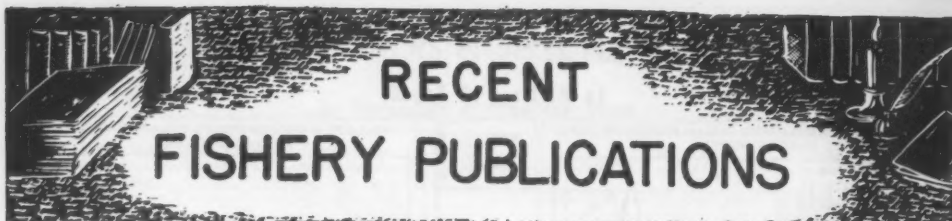


LEGEND

--- 1957

— 1956





# RECENT FISHERY PUBLICATIONS

## FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

- CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
- SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
- SSR - FISH - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).
- SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

- | Number            | Title   |
|-------------------|---|
| CFS-1562          | - Florida Landings, March 1957, 6 pp.   |
| CFS-1576          | - Massachusetts Landings, January 1957, 3 pp.   |
| CFS-1582          | - Ohio Landings, May 1957, 2 pp.  |
| CFS-1583          | - Florida Landings, April 1957, 6 pp.   |
| CFS-1586          | - Shrimp Landings, 1956 Annual Summary, 8 pp.   |
| CFS-1588          | - Alabama Landings, April 1957, 2 pp.   |
| CFS-1589          | - South Carolina Landings, May 1957, 2 pp.  |
| CFS-1590          | - Georgia Landings, May 1957, 2 pp.   |
| CFS-1591          | - Frozen Fish Report, June 1957, 2 pp.  |
| SL-116            | - Firms Canning Food for Animals from Marine-Animal Products, 1956 (revised).   |
| SSR-Fish. No. 201 | - Preliminary Report on Expedition Eastropic, by Joseph E. King, Thomas A. Austin, and Maxwell S. Doty, 155 pp., illus., March 1957. Describes the methods used and the results obtained in observations made aboard the research vessel Hugh M. Smith on the EASTROPIC expedition, a cooperative oceanographic survey of the central and eastern tropical Pacific, September-December 1955. Information was obtained on east-west gradients in temperature, salinity, phosphate, zooplankton, and forage-fish abundance. By means of closing-net hauls a special study was made of the vertical distribution of zooplankton. In collaboration with the University of Hawaii, carbon fixation and chlorophyll measurements were made on the east-to-west leg of the cruise. A survey of tuna baitfish was conducted in the Marquesas Islands. |
| SSR-Fish. No. 202 | - Creel Census on the Upper Mississippi River, by John Greenbank, 59 pp., illus., March 1957.   |
| SSR-Fish. No. 214 | - Surface Water Temperatures along Atlantic and Gulf Coasts of the United States, by Dean F. Bumpus, 156 pp., illus., April 1957.   |

SSR-Fish. No. 218 - Fish and Shellfish Consumption in Public Eating and Drinking Places, 112 pp., June 1957. The results of a survey made by the Bureau of the Census of the Department of Commerce for the Bureau of Commercial Fisheries to secure information which would help the fishing industry improve old markets and develop new ones. It was found that when a customer whether he be in the north, south, east, or west wants shellfish, his first choice is shrimp in two out of three of the Nation's public eating places which serve fish or shellfish. But if he wants fish, and he lives in the northeastern part of the country, his choice in public eating places will be tuna, flounder, haddock, and halibut in the order named. If he lives in the north-central area, his choice will be ocean perch, pike, haddock and catfish; in the south it will be catfish, sea trout, flounder, and cod; and in the west he will choose halibut, salmon, tuna, and flounder. The study also indicates that fish or shellfish is the main dish in 17 percent of all meals served in the 208,100 eating places that serve fish and shellfish. But there are still 190,000 of the total 398,000 public eating places which for some reason do not serve fish or shellfish.

SSR-Fish. No. 219 - The Spawning Behavior of the Channel Catfish *Ictalurus punctatus*, by Howard P. Clemens and Kermit E. Sneed, 15 pp., June 1957. Channel catfish were induced to spawn in glass aquaria by the injection of fish pituitaries. The normal spawning pattern and behavior probably was not modified by the injections. During the prespawning period the male hazed the female and both were belligerent toward other fish. Pairing was accomplished when the female was subdued and assumed a given position on the bottom of the aquarium. The emission of sex products was preceded by a spawning reflex in which the male wrapped his tail around the head of the female and quivered, while the female responded in like manner. The spawning act required about 6 hours and eggs were released about 9 times each hour. Bright lights, visitors, or handling the spawners did not materially interfere with or delay the spawning act. The males cared for the eggs after the spawning was completed. Males were used to spawn with more than one female, but the females usually deposited all their eggs during one spawning.

Sep. No. 483 - Laboratory Method of Obtaining Unsaturated Fatty Alcohols from Fish Oils.

Sep. No. 484 - Research in Service Laboratories (August 1957): Contains these articles--"Discoloration in Precooked Tuna for Canning."

"Inspection Aid for Voluntary U. S. Standards for Frozen Fried Fish Sticks Released;" "Frozen Fish Packaging Improvement Proposed;" "Revised and New Federal Specifications Planned for Five Fishery Items;" "Technical Note No. 40 - Experimental Mobile De-Icing, Washing and Weighing Unit for Unloading Fish From Vessels."

THE FOLLOWING SERVICE PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED.

Gulf Monthly Landings, Production, and Shipments of Fishery Products, June 1957, 5 pp. (Market News Service, U. S. Fish and Wildlife Service, 609-611 Federal Bldg., New Orleans 12, La.) Gulf States shrimp, oyster, finfish, and blue crab landings; crab meat production; LCL express shipments from New Orleans; and wholesale prices of fish and shellfish on the New Orleans French Market; for the month indicated.

Monthly Summary of Fishery Products Production in Selected Areas of Virginia, North Carolina, and Maryland, June 1957, 4 pp. (Market News Service, U. S. Fish and Wildlife Service, 18 So. King St., Hampton, Va.) Fishery production for the Virginia areas of Hampton Roads, Lower Northern Neck, and Eastern Shore; the Maryland areas of Crisfield, Ocean City, and Cambridge; and the North Carolina areas of Atlantic, Beaufort, and Morehead City; together with cumulative and comparative data; for the month indicated.

(New York) Monthly Summary - March 1957 - Receipts of Fishery Products at the New York City Wholesale Salt-Water Market, 16 pp. (Market News Service, U. S. Fish and Wildlife Service, 155 John St., New York 38, N.Y.) Receipts in the salt-water section of the Fulton Fish Market by species and by states and provinces for the month indicated.

## MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

### ANTARCTICA:

The Conquest of the Antarctic, by Norman Kemp, 152 pp., illus., printed, \$4.75. Philosophical Library, Inc., 15 East 40th St., New York 16, N.Y., 1957. Presents a complete and fascinating history of the little-known continent of Antarctica. The text is made very vivid by the inclusion of many photographs of the men, vessels, and coastal regions discussed. The author has timed the writing of this book to coincide with the impending separate expeditions of Britain, New Zealand, U.S.S.R., and the United States, to conquer the Antarctic. Background information available on the proposed expeditions, including personal interviews with some of the members, comprises the largest part of the book. One

chapter is devoted to the United States' "Operation Deep Freeze." During that operation, only four species of animal life were observed--killer whales, skua gulls, penguins, and seals. In summarizing his account of the Antarctic, the author states that, "This immense and unrevealed wilderness of rock and ice will continue to invite adventure, and appeal to the imaginations of ambitious and energetic men."

### CANADA:

"Summary Statistics of Canada's Fisheries, 1936-1955", 32 pp., printed. (Reprinted from Canadian Fisheries Annual, 1957, pp. 67-98.) Canadian Fisheries Annual, Gardenvale, Quebec, Canada. The first of eight sections of this report covers summary statistics for all Canada in regard to landings and values of catches from 1949-1956, value of gear and craft, and number of fishermen and men in plants. The other sections present detailed data on east coast fisheries--Newfoundland, Maritimes, and Quebec; fresh-water fisheries; West Coast fisheries; fillet production; and exports and imports.

### COMMISSIONS:

Ninth Annual Report of the Pacific Marine Fisheries Commission for the Year 1956 (to the Congress of the United States and to the Governors and Legislatures of Washington, Oregon, and California), 16 pp., printed. Pacific Marine Fisheries Commission, 340 State Office Bldg., 1400 S. W. Fifth Ave., Portland 1, Ore. Describes the Commission's meeting of November 26-28, 1956, at which recommendations were adopted for 1957 concerning regulations of petrale sole fishery; troll chinook salmon fishery; ocean salmon--troll and gill-net fishery; tuna; sablefish (blackcod); and otter-trawl fishery. Also included are a brief summary of the Commission's history; a list of names of the Commissioners, officers, and advisors; and financial reports.

### CRABS:

Retort Cooking of Blue Crabs, by Robert A. Littleford, Bulletin No. 1, 16 pp., illus., printed. Seafood Processing Laboratory, University of Maryland, Crisfield, Md. Reports on investigations made in regard to the retort cooking of crabs to determine (1) whether differences in yield of meat resulting from variations in crabs could be compensated for by modifications in cooking time; (2) an optimum time for cooking crabs based upon percent yield, length of shelf life, and quality of meat; and (3) the actual heat penetration of the crabs during the cooking process. It was concluded that a 10-minute cook at 15 pounds pressure and 250° F. produced the best results.

### DENMARK:

Arbejdet fra Fiskeriministeriets Forsøgslaboratorium for 1956 (Annual Report to the Danish Fishing Industry for 1956), 39 pp., illus., printed in Danish with English translation of the main experimental results. Fiskeriministeriets Forsøgslaboratorium, Copenhagen, Denmark 1957. Describes the results of the following experiments: fat determination in herring and sand eels; determination of the nutritional value of fish for animal feed; keeping quality of

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fresh fish; chilling of fish; antibiotics as a means of preserving fish; antibiotic content in the fish; hygienic requirements for shellfish; painting fish boxes; freezing fish and shellfish, such as shrimp, trout, mackerel fillets, catfish fillets, and cod roe; semi-preserved fishery products; canned cod roe, fish meal; and fish silage.

#### FISHES:

Fishes: A Guide to Familiar American Species, by Herbert S. Zim and Hurst H. Shoemaker, 180 pp., 278 color drawings, printed, limp bound \$1, de luxe cloth \$1.95. Simon and Schuster, New York, N. Y., 1956. A booklet showing the 278 species which represent most of the families of American bony fishes. Notes on sharks and rays, lampreys and hagfishes, and animals mistaken for fishes are also presented.

#### FOOD AND AGRICULTURE ORGANIZATION:

Directory of Fisheries Institutions: Asia and the Far East, 78 pp., printed. Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Far East, Bangkok, Thailand, 1957.

#### FOOD CONSUMPTION:

Dietary Levels of Households in the United States, Household Food Consumption Survey 1955 Report No. 6, 69 pp., processed, 45 cents; Dietary Levels of Households in the Northeast, Report No. 7, 69 pp., processed, 45 cents; Dietary Levels of Households in the North Central Region, Report No. 8, 69 pp., processed, 40 cents; and Dietary Levels of Households in the South, Report No. 9, 69 pp., processed, 45 cents. U. S. Department of Agriculture, Washington, D. C., 1957. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.) These reports on the nutritive content of diets, including fish and shellfish, contain portions of the data from the U. S. Department of Agriculture's nationwide Survey of Household Food Consumption made in the spring of 1955. Previous reports in this series have presented the data on quantities of foods used during the week, which are the basis of calculations of nutrient content of household food supplies in these reports. The survey was based on a national probability sample of approximately 6,000 housekeeping households of one or more persons. These reports discuss and tabulate the rural-urban differences in dietary levels as well as the differences by income groups.

#### GENERAL:

Fisheries Research Papers, vol. 2, no. 1, June 1957, 76 pp., illus., printed. Washington Department of Fisheries, Olympia, Wash. Contains the following articles: "The Vertical and Horizontal Distribution of Seaward Migrant Salmon in the Forebay of Baker Dam," by William H. Rees; "Downstream Migrant Salmon Survival in Free Fall from a Ski-Jump Spillway," by Albert F. Regenthal; "Observations on the Distribution and Biology of the Pink Shrimp (*Pandalus jordani*) off the Washington Coast," by Herb. C. Tegelberg and John M. Smith; "The

Quality of Seed Oysters from Japan," by Charles E. Woelke; "Migration and Growth of the Dogfish Shark, *Squalus acanthias* (Linnaeus), of the Eastern North Pacific," by Gilbert A. Holland; "Rare Fishes from the Eastern North Pacific Ocean," by Arthur D. Welander, Dayton L. Alverson, and Peter Bergman; "Brine Shrimp Nauplii (*Artemia gracilis*) as Food for Juvenile Pink Salmon," by J. A. Coates, C. H. Ellis, and R. L. Schwab; and "Survival Capacity of Spermatozoa of the Chinook Salmon and Steelhead Trout," by Richard T. Smith and Elmer Quistorff.

Natural History, Vol. LXVI, No. 6, June 1957, 336 pp., illus., printed, 50 cents. American Museum of Natural History, Central Park West at 79th St., New York 24, N. Y. Contains among others, the following well-illustrated articles: "The Fish that made History," by Gary Webster--an account of the important part played by the codfish in the development of the New World; "Crayfish Are Like That," by John H. Garrard--describes the appearance and behavior of crayfish found in United States streams; and "White Whales of the Amazon," by Ross Allen and Wilfred T. Neill--a report on the expedition that brought the first living specimens of the Amazon River dolphin to the United States.

"On the Transport of Live Cod and Coalfish," by Gunnar Sundnes, article, *Journal du Conseil*, vol. XXII, no. 2, pp. 191-196, illus., printed, single copy Kr. 12 (US\$1.74). Messrs. Andr. Fred. Høst & Søn, Bredgade, Copenhagen, Denmark, February 1957.

"Recent Experiments on Trawler Icing," article, *World Fishing*, vol. 6, no. 5, May 1957, pp. 64-72, illus., printed. John Trundell (Publishers) Ltd., Temple Chambers, Temple Avenue, London, E. C. 4, England. Describes laboratory experiments conducted with trawler models to determine possible methods of protection against ice formed on trawlers by freezing sea spray. Rates of icing and hazards to stability of trawlers under various conditions are discussed in detail.

Seafarer's and Their Ships (The Story of a Century of Progress in the Safety of Ships and the Well-being of Seamen), 96 pp., illus., printed, \$3.50. Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y. This well-illustrated booklet shows how the present pattern of relationship between Britain's Marine Department and the shipping industry has developed through the years. Since the passing of the Merchant Shipping Act of 1854, much has been done to improve the conditions of life at sea and the efficiency of the Merchant Navy, and to strengthen the measures taken to safeguard the lives of those who serve in ships both on the high seas and off the coasts of Britain. The functions and responsibilities of the Marine Department have remained in principle the same--the safety and well-being of the merchant ships and seamen. These responsibilities and functions have developed with the years and the growing complexity of ships, and the purpose of



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this book is to describe something of this development.

#### HONG KONG:

Hong Kong Annual Department Report by the Acting Director of Agriculture, Fisheries & Forestry (for the Financial Year 1955-56), 97 pp., illus., printed. Government Printer, Java Road, Hong Kong. This publication contains the annual reports of the various divisions of the Department of Agriculture, Fisheries and Forestry. Included in the report of the Fisheries Division is a review of its activities during the year, which were directed mainly to the Marine fisheries and the mechanization of the fishing fleet, fishing investigations, training of fishermen, fresh-water fisheries, and oyster culture. Tables in the appendix give the number and type of Hong Kong fishing craft and fishermen, and landings of the principal varieties of fish marketed by species.

#### ISRAEL:

Sea Fisheries (Report to the Government of Israel), by Dr. Alfred Perlmutter, USOM Agricultural Report No. 13, 109 pp., illus., processed. International Cooperation Administration, United States of America Operations Mission to Israel, 12-14 Harakevet St., Tel Aviv, Israel, October 1956. This report points out the potentialities of Israel's fisheries resources, recommends a program to obtain better utilization of these resources, and summarizes progress to date on the program. The first section of the report discusses each present and possible new fishery in an attempt to evaluate the potential of Israel's aquatic resources, and the second section suggests methods for their development to attain maximum utilization. It includes an outline of the program for the development of Israel's sea fishery resources and progress being made on the various aspects of the program. The appendices include (1) a list of the commercially-important fish, with names in English, Hebrew, Arabic, and Latin; (2) a list of commercially-important invertebrates and plants, in Latin, English, and Hebrew; and (3) a paper entitled "Use of the Estuarine and Sea Fish of the Family Mugilidae, Grey Mullet, for Pond Culture in Israel," by Alfred Perlmutter, Lyka Bograd, and Joel Pruginin.

#### MOI-LUSKS:

"Factors Affecting the Pollution and Self-Purification of Molluscan Shellfish," by P. C. Wood, article, Journal du Conseil, vol. XXII, no. 2, pp. 200-208, illus., printed, single copy Kr. 12 (US\$1.74). Messrs. Andr. Fred Høst & Søn, Bredgade, Copenhagen, Denmark, February 1957.

#### MULLET:

The Demand for Florida Mullet, by William S. Engleson and Marshall R. Colberg, Contribution No. 69 from the Oceanographic Institute, 12 pp., illus., printed. (Reprinted from Papers from the Oceanographic Institute, no. 2, 1956, pp. 77-88.) Oceanographic Institute, Florida State University, Tallahassee, Fla. Describes in summary form a statistical demand study pertaining to Florida-

caught mullet--Florida's most important food fish. Price and sales data, essential for a statistical demand study, were collected primarily by the U. S. Fish and Wildlife Service and also by the Florida State Board of Conservation.

#### NEW ZEALAND:

Annual Report of the Marine Department (1 April 1956 to 31 March 1957), 83 pp., printed. Government Printer, Wellington, New Zealand, 1957. This report contains, among others, a section on the fisheries of New Zealand which discusses crayfish, fishing vessels and personnel, fish landings, methods of capture, landings by ports, exports and imports, big-game fishing, fish-liver oil, whaling, oysters, toheroa, whitebait fishery, mussels, fresh-water fisheries and research, marine research, and legislation. The section concludes with a series of tables giving detailed data on the fisheries.

#### NORWAY:

Praktiske Fiskeforsøk, 1954 og 1955 (Practical Fishery Research, 1954 and 1955), Arabeitning Vedkommende Norges Fiskerier 1955, Nr. 9, 124 pp., illus., printed in Norwegian. A. S. John Griegs Boktrykkeri, Bergen, Norway, 1957.

#### OHIO:

Summary of the Ohio Lake Erie Commercial Fisheries, 1956, 17 pp., processed. Division of Wildlife, Ohio Department of Natural Resources, 1500 Dublin Rd., Columbus 12, Ohio. A statistical summary, compiled by the Department's Wildlife District One, Sandusky, pertaining to the Ohio commercial fisheries of Lake Erie for 1956. Catch statistics are shown by species, seasons, districts, months, gear, counties, and major ports. Data on the trap-net catch, percent of total catch (all gear), and average pounds per lift are given for 1956.

#### OYSTERS:

"The Cultivation of Mother-of-Pearl Oyster in the Red Sea," by C. Crossland, article, Australian Journal of Marine and Freshwater Research, vol. 8, no. 2, May 1957, pp. 111-130, illus., printed. Australian Journal of Marine and Freshwater Research, Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, East Melbourne, C. 2, Victoria, Australia.

"The Culture of Oysters in North-Western Spain," by Manuel Sanchez y Sanchez, article, Journal du Conseil, vol. XXII, no. 2, pp. 197-199, printed, single copy Kr. 12 (US\$1.74). Messrs. Andr. Fred. Høst & Søn, Bredgade, Copenhagen, Denmark, February 1957.

#### ROCKFISHES:

A Review of the Rockfishes of California (Family Scorpaenidae), by Julius B. Phillips, Fish Bulletin No. 104, 158 pp., illus., printed. Department of Fish and Game, Sacramento 14, Calif., 1957. The rockfishes and scorpion fishes form one of the most important fish families in the ocean waters of California. At present, in California waters, this family is repre-



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sented by 49 species in the genus *Sebastodes*, two in the genus *Sebastolobus*, and one in the genus *Scorpaena*. Not only does this family contain more species than any other marine or fresh-water fish family known to inhabit our waters, but most of the species are highly desirable for food. This report presents uniform, concise descriptions of all the species comprising the family Scorpaenidae in California waters. Keys and photographs of all these species are presented to facilitate identification. Proper identification of the 52 kinds of rockfish, inhabiting our waters, will not only aid the industry by providing means of maintaining a uniformity in its products, but is logically the first step in helping to speed future research studies on this increasingly important group of fishes. Although the keys resulting from this study are primarily for identification of adult fish, juveniles are included when available.

#### SALMON:

"Investigation and Management of the Atlantic Salmon, 1956," article, *Trade News*, vol. 9, no. 12, June 1957, pp. 3-18, illus., printed. Department of Fisheries of Canada, Ottawa, Canada. A review of the present situation and the progress made in Canada's Atlantic salmon research and management program. This review includes an article on the changing environment of the Atlantic salmon, by Dr. J. L. Kask, Chairman of the Fisheries Research Board of Canada. Two other articles constitute the report of the Scientific Subcommittee on the progress made in the investigational and management activities during 1956. Part I deals with the research program and is by Dr. C. J. Kerswill of the Research Board's Biological Station at St. Andrews, N. B. The second half of the report, by Dr. W. M. Sprules, Special Assistant to the Deputy Minister of Fisheries of Canada, Ottawa, deals with the management program.

Electric Screens for Adult Salmon, by F. J. Andrew, P. C. Johnson, and L. R. Kersey, 43 pp., illus., printed. International Pacific Salmon Fisheries Commission, New Westminster, Canada, 1956.

Further Experiments with an Electric Screen for Downstream-Migrant Salmon at Baker Dam, by F. J. Andrew, P. C. Johnson, and L. R. Kersey, 29 pp., illus., printed. International Pacific Salmon Fisheries Commission, New Westminster, Canada, 1956.

#### SARDINES:

Algunos Aspectos del Desarrollo Inicial del Ovario de Sardina (SARDINA PILCHARDUS Walb.). (Some Aspects of the First Stages of Ovarian Development of the Sardine), by Jaime dos Santos Pinto and Buenaventura Ansreú, *Notas e Estudos do Instituto de Biologia Marítima* No. 13, 12 pp., illus., printed in Portuguese with summary in English. Instituto de Biologia Marítima, Lisbon, Portugal, 1956.

A Sardinha do Norte de Portugal (SARDINA PILCHARDUS Walb.). Características Etárias e de Reprodução (North Portugal's Sardines. . . Life

History and Spawning Characteristics), by J. Amorim Machado Cruz, *Notas e Estudos do Instituto de Biologia Marítima* No. 14, 45 pp., illus., printed in Portuguese with summary in English. Instituto de Biologia Marítima, Lisbon, Portugal, January 1957.

#### SEAWEED:

(Institute of Seaweed Research) Annual Report for 1956, 24 pp., illus., printed. Institute of Seaweed Research, Inveresk, Midlothian, Scotland. As a result of the recommendation made by the Advisory Council on Scientific Policy, as indicated in the 1955 Annual Report, the scale and scope of the Institute's operations have been reduced during the year under review. Originally the Institute's purpose was to determine whether the possibility existed of creating a stable Scottish seaweed industry which could compete with those of other countries and at the same time provide a considerable part-time industry in the Highlands and Islands. From July 1, 1956, its original purpose having been fulfilled, the Institute's responsibilities have been as follows: (a) to support fundamental algal research; (b) to operate an information service; (c) to provide advice and technical assistance in connection with the development of the seaweed resources of the Highlands and Islands of Scotland; and (d) to supply algal chemicals for research at cost and to stimulate interest in their utilization. This report gives a summary of the work carried out under extramural contract and on a collaborative basis during 1956 covering algal chemistry, plant physiology, microbiology, and use of algal chemicals in medicine.

#### SHRIMP:

"A Revision of the Australian Species of Penaeidae (Crustacea Decapoda: Penaeidae), by W. Dall, article, *Australian Journal of Marine and Freshwater Research*, vol. 8, no. 2, May 1957, pp. 136-231, illus., printed. Australian Journal of Marine and Freshwater Research, Commonwealth Scientific and Research Organization, 314 Albert Street, East Melbourne, C.2, Victoria Australia.

#### SMALL CRAFT:

High-Speed Small Craft, second revised edition, by Peter Du Cane, 336 pp., illus., printed, \$15. Philosophical Library Inc., 15 East 40th St., New York 16, N. Y., 1957. A revised edition of an excellent book covering all phases of the design and construction of high-speed marine craft. It is illustrated by numerous photographs, charts, and diagrams which greatly enhance the value of this book for all concerned in any way with the designing and powering of small high-speed craft. The various chapters discuss the types of high-speed craft, seaworthiness and maneuverability, design, materials, structure, application of plywood and laminated-wood construction in marine craft, installation of main machinery, transmission, steering gear, reverse gear, cruising engines, model experiments, propellers, speed trials, dynamic stability, and electric arrangements in high-speed craft. In addition, the revised edition contains several new chapters on the principles underlying the

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performance of planning craft in theory and practice, rudder design in plan form and section, reinforced plastics for boat-building, light alloys in high-speed craft, propelling machinery, and use of models for prediction of behavior in rough water.

#### SWEDEN:

Fishermen's Organizations and the Regulation of Fish Prices in Sweden, by Christian Hessele and Sigmund Verstandig, FAO Fisheries Study No. 4, 106 pp., illus., printed, 5s. (US\$1). Food and Agriculture Organization of the United Nations, Rome, Italy, 1957. (For sale at Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.) The authors state that "The principal aim of this paper is to provide a description of the organizations of the Swedish fishermen and the system of regulating fish prices, written in such a way as to enable fisheries administrators and fishermen in other countries to benefit from the experiences gained in Sweden. The reason the description embraces both fishermen's organizations and price regulations is that in Sweden these regulations, to a great extent, are administered in collaboration with the fishermen's organizations. In order to give a picture of the background to the main subjects treated in this paper, the fishing industry, the fishing population, and the governmental administration of the fisheries in Sweden have been briefly reviewed in the first part." Part 2 discusses the origin and early development of the fishermen's and the fish dealers' organizations; Part 3, the fishermen's professional unions; Part 4, the fishermen's cooperative trading associations; and Part 5, price regulations.

#### TRAWLING:

Deep Sea Trawling, by John Garner, 98 pp., illus., printed. The Gourock Ropework Co., Ltd., Port Glasgow, Scotland, 1956. Trawling is the most extensive method used for catching fish, and various types of gear or rigs for small or large trawls are used, but irrespective of size they are all of the same principle, namely, to drag along the bottom of the sea. The trawl described in this book is the most popular for deep-sea fishing, and even after being used for many years it has not altered much from the original. This book describes and illustrates in detail the materials used in making nets for trawling, the different steps in braiding the nets, how the trawl net pieces can be worked out in theory before each piece is made, details of a trawl, the rope and wire working gear, the running gear, and the hauling and shooting gear. Net mending is also described and illustrated.

#### TUNA:

A Study of Bluefin Tuna Populations from the Eastern and Western North Atlantic Based on an Analysis of Fin-Ray and Gill-Raker Counts (The Charles F. Johnson Oceanic Gamefish Investigations), by C. Richard Robins, Report No. 57-13, 8 pp., processed. The Marine Laboratory, University of Miami, Coral Gables, Fla.

#### Identification of the Pink Pigment of Canned Tuna,

by W. Duane Brown and A. L. Tappel, 8 pp., illus., printed. (Reprinted from *Food Research*, vol. 22, no. 2, 1957, pp. 214-221.) Department of Food Technology, University of California, Davis, Calif. A report on results of experiments leading to the identification of the pink pigment of tuna as a hemochrome. Knowledge of the chemical nature of this pigment is of considerable importance in studies of discoloration of canned tuna.

"On the Distribution of Catches by Tuna Long-Line," by T. Yoshihara, article, *Journal of the Tokyo University of Fisheries*, vol. 41, no. 1, pp. 1-26, illus., printed. The Tokyo University of Fisheries, Tokyo, Japan, 1954. For a number of years Japanese scientists have explored fishing grounds with a view to helping promote an active and productive offshore fishery for tuna. In particular, they have paid attention to the depths of the swimming layers of different species and also to the correlation of catches at different depths with hydrographic data. This paper presents some of the data collected in the course of extensive investigations, and studies in some detail the horizontal and vertical distributions of three sets of tuna catches by vessels working in the Pacific Ocean during 1949, 1950, and 1952. The first part of the paper deals with a method of determining the depth of fishing of each hook from the known dimensions of the length of a basket and the length of the float and branch lines. A table and graph have been prepared to facilitate the conversion of this ratio into the required co-ordinates, and the actual depths of the hooks in baskets of five and six hooks, for unit length of main line, are presented. The rest of the paper deals with the spatial distribution of the different species based on actual catch data. The paper concludes with some comments on the relationship between catch and water temperature.

#### WASHINGTON:

1956 Fisheries Statistical Report, 88 pp., printed. Washington State Department of Fisheries, Fishermen's Terminal, Seattle 9, Wash., May 1957. This edition represents an extension of the statistical series to include a wider scope of material. It covers statewide commercial catches of fish and shellfish, Fraser River sockeye pack, Puget Sound salmon, Grays Harbor catch figures, Willapa Harbor catch figures, Columbia River catch figures, licenses and receipts, the Indian fisheries, miscellaneous statistics, plantings of hatchery salmon and egg takes at hatcheries, and fishway counts. Major additions to the commercial fishing tables include Indian catch figures, published here for the first time, and hatchery and fishway counts formerly found in the Annual Report series. According to this report, "The 1956 commercial fisheries of the State (Washington) produced a total of 122,464,148 pounds of fish and shellfish worth \$21,574,670 to the fishermen and \$44,485,900 at the wholesaling and processing level. The retail value was estimated at \$62,280,260. The

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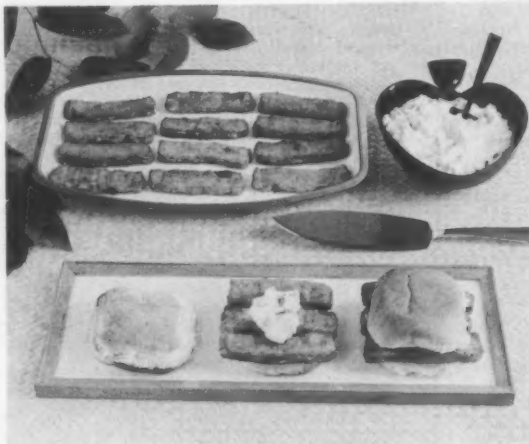
statewide canned salmon pack from local fish amounted to 186,787 48-pound cases, the lowest pack since 1944, and far below the 1935-1955 average. It was an off-year for pink salmon, sockeye salmon catches did not quite reach expectations, and the Puget Sound chum season was a failure. Production composed 3.1 percent

of the poundage and 7.1 percent of the value of all fish and shellfish produced by the United States and Alaska. Nine states and Alaska outranked Washington in aggregate landings, but the value of the State's canned and processed fish continued to rank third highest."



### FISH STICKS--TIME SAVERS EVERYONE FAVORS

When you prepare seafood the modern way, as in golden-fried fish sticks, there is no cleaning, no waste, no breading, no defrosting, and no frying. Each fish stick is frozen individually so you can prepare as many or as few as you like at any time. They are low in price, readily available, flavorful, and certainly easy-to-prepare.



The fish mainly used in the preparation of the fish sticks are cod, haddock, pollock, salmon, and halibut, but other species are used in lesser amounts. The fish are filleted and the fillets are then frozen into uniform blocks. The frozen blocks are cut into rectangular-shaped sticks weighing about one ounce. The sticks are dipped into batter, breaded and fried in deepfat. The cooked sticks are then packaged, frozen, and shipped for distribution into retail outlets all over the United States.

A popular quick luncheon item, recommended by the home economists of the Fish and Wildlife Service, that will click with all members of the family, especially the small fry, are "fishburgers" served with tartar sauce. The preparations are simple, but the "fishburgers" are tasty and nutritious.

Place the fish sticks in a single layer in a baking pan. Bake in a hot oven, 400° F., for 15 to 20 minutes or until heated through and crisp. Place two fish sticks on a toasted buttered roll and serve with tartar sauce.

#### TARTAR SAUCE

- |  |                              |
|--|------------------------------|
| $\frac{1}{2}$ CUP MAYONNAISE OR SALAD DRESSING | 1 TABLESPOON CHOPPED PARSLEY |
| 1 TABLESPOON CHOPPED ONION                     | 1 TABLESPOON CHOPPED OLIVES  |
| 1 TABLESPOON CHOPPED PICKLE                    |                              |

Mix thoroughly and chill. Serves 6.

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## ARE ALL OCEAN CURRENTS CAUSED BY WINDS?

No. Ocean currents also occur as a result of differences in water pressure. These differences may be caused by wind, which piles water up against a coast or by variations in the density. The latter results when evaporation from the water surface and the supply of fresh water are not equal, or when the gain and loss of heat are not the same. In the Baltic Sea, the surface water is lighter and flows into the North Sea. The North Sea water is heavier and flows into the Baltic beneath the surface. On the other hand, in the Mediterranean where loss by evaporation exceeds the supply of fresh water, water becomes heavier than Atlantic water. The former therefore flows into the Atlantic at Gibraltar, below the surface, whereas water from the Atlantic flows on the surface into the Mediterranean. Nearly all bottom water in the oceans is formed in the Antarctic where, in the Wedell Sea, surface water is cooled to such a degree that it sinks to the bottom.

--Sea Secrets, The Marine Laboratory,  
University of Miami, Coral Gables, Fla.

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## ALLIGATORS STILL FORMIDABLE CREATURES, BUT SMALLER

Although alligators remain formidable creatures, they no longer are growing to their former massive proportions, according to records maintained by the Fish and Wildlife Service of the Department of the Interior.

A century ago, 15-foot alligators were pretty much run-of-the-mill. Fourteen-footers were still around as recently as 50 years ago. But today a twelve-foot specimen is regarded as near the maximum.

That is why an alligator measuring 13½ feet caused something of a stir when he was hauled out of the water at the Delta National Wildlife Refuge in Louisiana. He was promptly dubbed "Ol' Gram'pa" and entered in the records as the biggest alligator ever taken on Delta Refuge.

Like the bison, the alligator has been subjected to heavy hunting in years gone by. Because of the inaccessibility of some of its habitat, however, the alligator has been able to survive in large numbers despite greatly decreased living space and a century of extremely heavy harvesting.

From 1800 until 1891, more than 2,500,000 of these animals were harvested in the State of Florida alone. As late as 1900, some 280,000 alligator skins were being processed in the United States annually. The harvest varies from year to year, and from refuge to refuge. "Ol' Gram'pa" was one of 400 taken last year on Delta Refuge. But on the Sabine National Wildlife Refuge, also in Louisiana, the harvest has been as great as 1,300 in a year.

Several of the refuges in the South have natural habitat for alligators. The Department's Fish and Wildlife Service follows management practices which will assure all species of wildlife as much living room as possible. Alligators are protected until their numbers approach the carrying capacity of their habitat, and then harvesting is permitted.

Among the natural enemies of the alligator are the raccoon and the bear. The raccoon does not match his legendary shrewdness against the snapping jaws and the whipping tail of an alligator, and the bear does not engage the 'gator in direct conflict. But the alligator is an egg-laying reptile, and the raccoon and the bear obtain those morsels with comparative safety.

The young alligator is eight inches long at hatching, and weighs about two ounces. It gains only a half-pound the first year and is prey of a number of denizens living in or near the water. Even larger young 'gators are fair food for gar and other fish which reach large dimensions.

But at three years, the alligator weighs about 15 pounds and measures three feet. He then is able to take care of himself against most adversaries.

Drouth is a distinct enemy of the alligator. It kills a lot of the things upon which the alligator feeds, and destroys his natural habitat.

As with many other examples of wildlife, individual alligators are "tagged" for purposes of biological study. Fish and Wildlife Service personnel do their alligator tagging at night from small boats. They confine their efforts to the juveniles, avoiding personal tussels with alligators more than three feet long. When tagging operations are under way, a dozen or two of the animals are caught during an evening, and the metal tags affixed.

Alligator hides do not attract high prices on the market. Three or four decades ago, a seven-foot specimen would be worth from 90 cents to \$4.65, depending for the most part upon the location of the market and the quality of the hide. Pricing today is based on a per-foot-of-alligator basis, with prices ranging from \$1.25 to \$2.50 per foot.





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